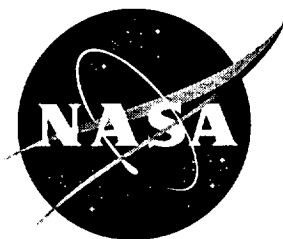


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NASA Contractor Report 201712, Volume II



Sensitivity of Runway Occupancy Time (ROT) to Various Rollout and Turnoff (ROTO) Factors

Volume II - Complete Set of Plotted Data

S. H. Goldthorpe

McDonnell Douglas Corporation, Long Beach, California

Contract NAS1-19703

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National Aeronautics and
Space Administration
Langley Research Center
Hampton, Virginia 23681-0001

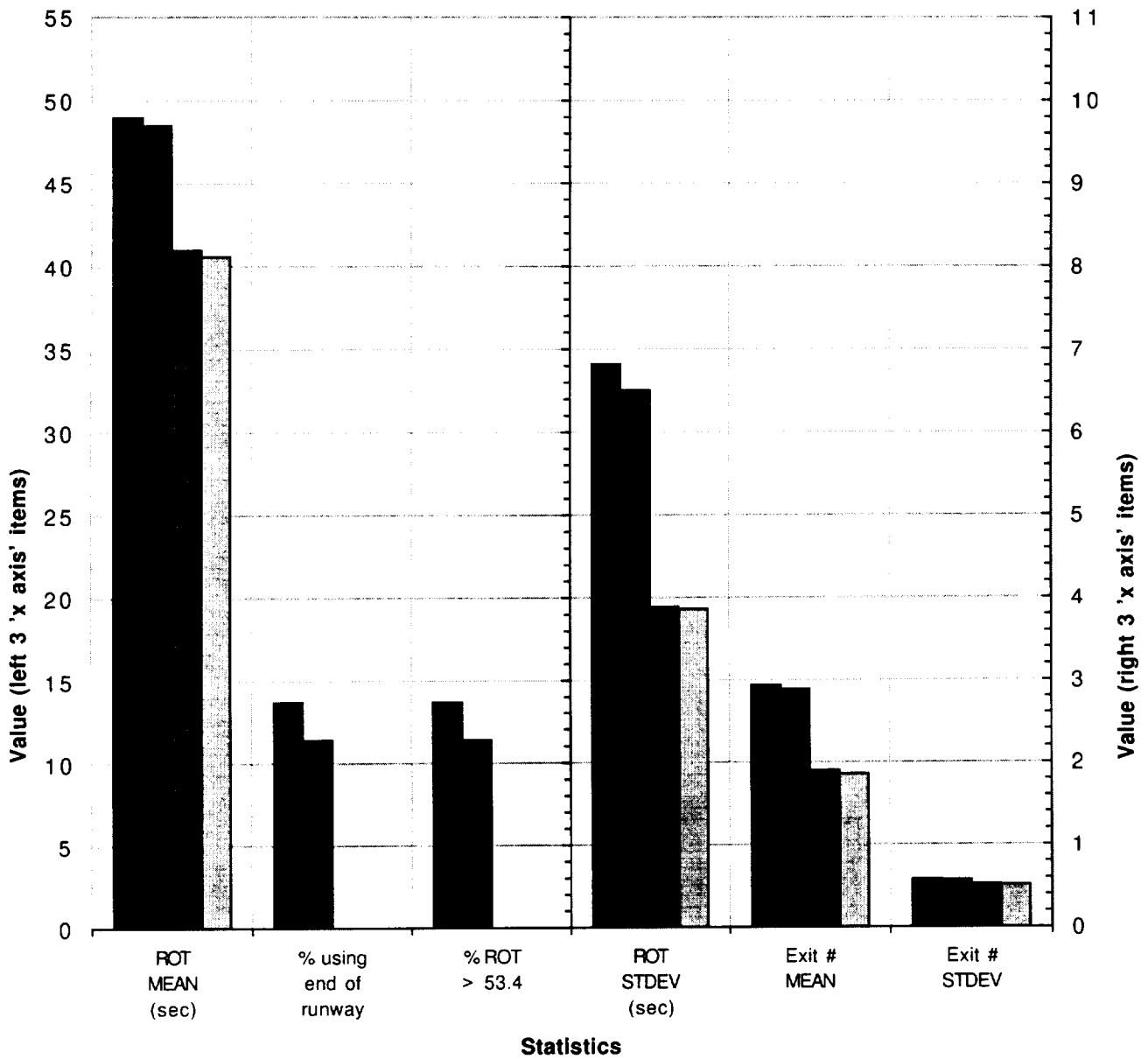
| | |
|--|----|
| 1. PLOTTED ROT SENSITIVITY DATA..... | 1 |
| 2. 3-D ROT DISPERSION & PROBABILITY DISTRIBUTION GRAPHS. | 49 |

■ MD-11; wet surface condition; Table data row 1

■ MD-11; dry surface condition; Table data row 2

■ MD-81; wet surface condition; Table data row 3

▨ MD-81; dry surface condition; Table data row 4



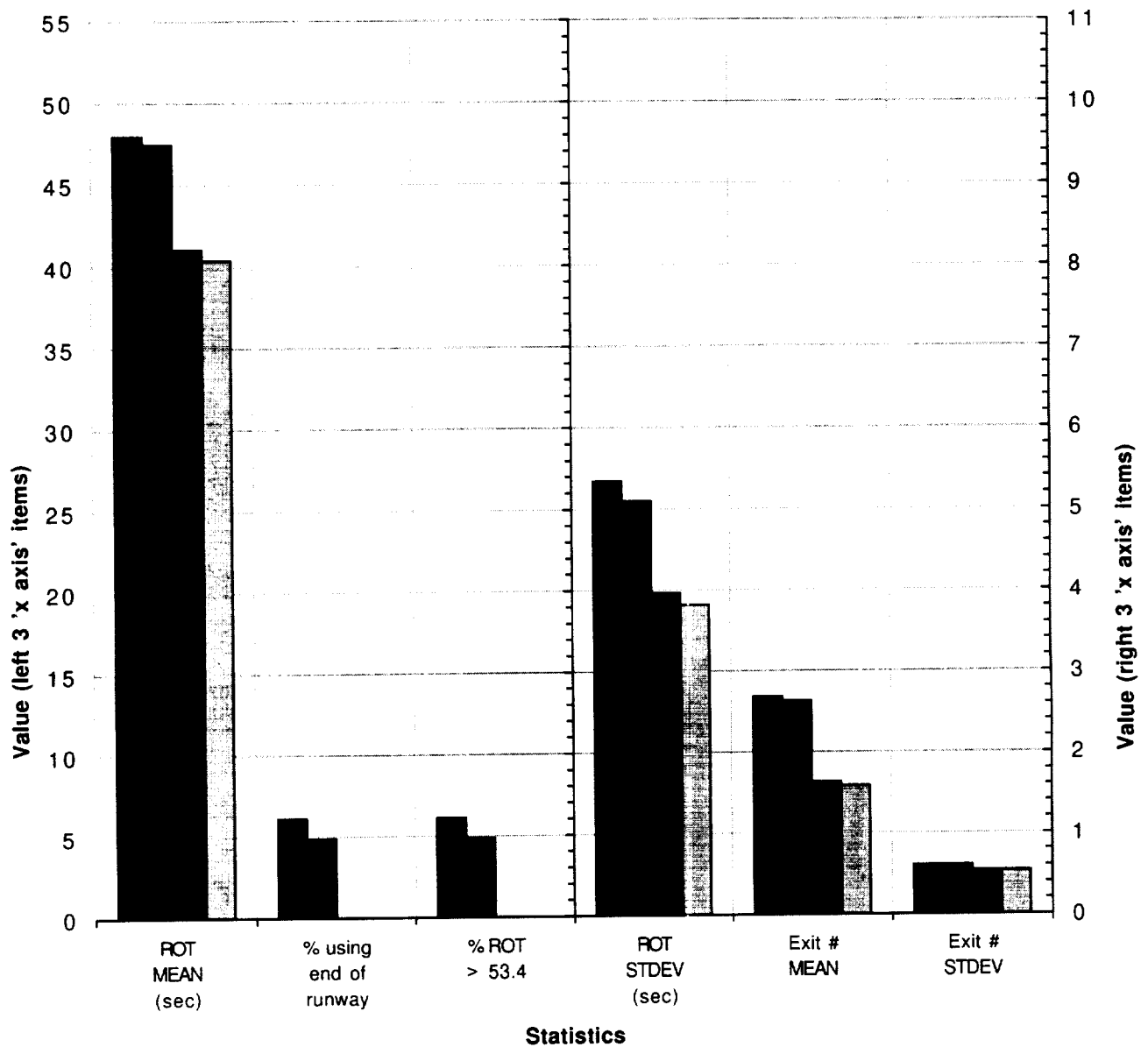
**Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 4950**

■ MD-11; wet surface condition; Table data row 6

■ MD-11; dry surface condition; Table data row 7

■ MD-81; wet surface condition; Table data row 8

▨ MD-81; dry surface condition; Table data row 9



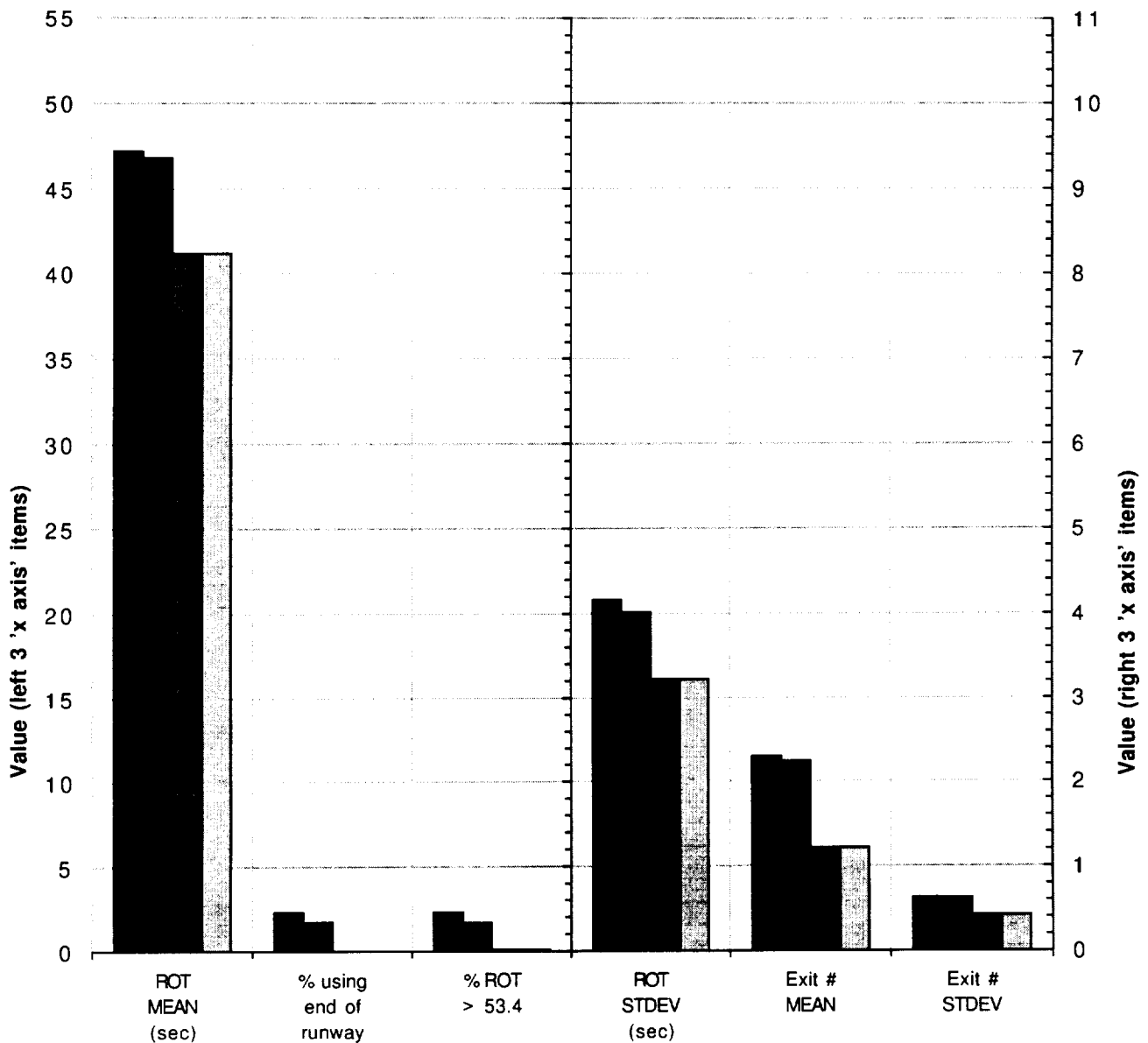
**Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5350**

■ MD-11; wet surface condition; Table data row 11

■ MD-11; dry surface condition; Table data row 12

■ MD-81; wet surface condition; Table data row 13

□ MD-81; dry surface condition; Table data row 14



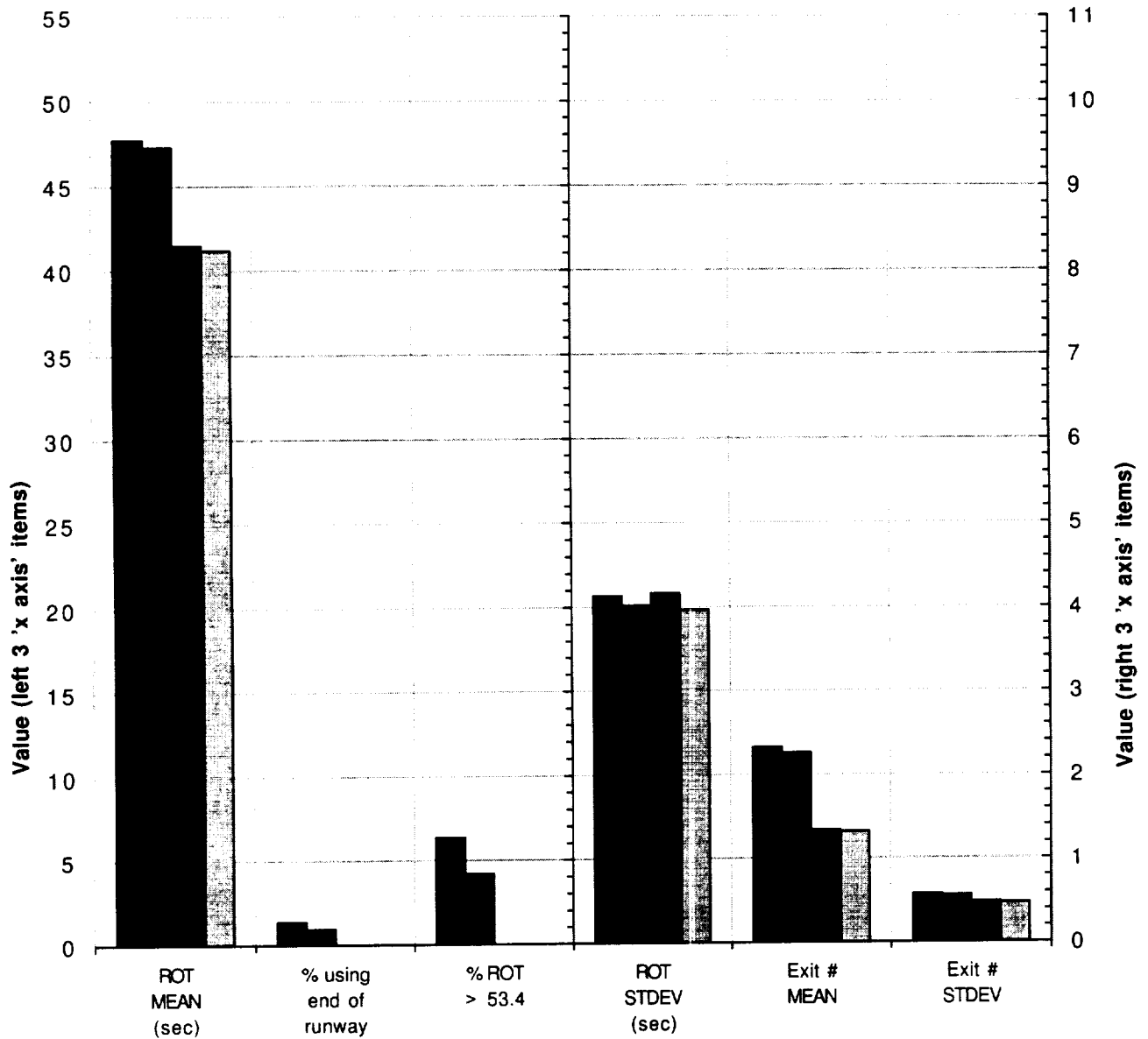
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950

■ MD-11; wet surface condition; Table data row 16

■ MD-11; dry surface condition; Table data row 17

■ MD-81; wet surface condition; Table data row 18

□ MD-81; dry surface condition; Table data row 19



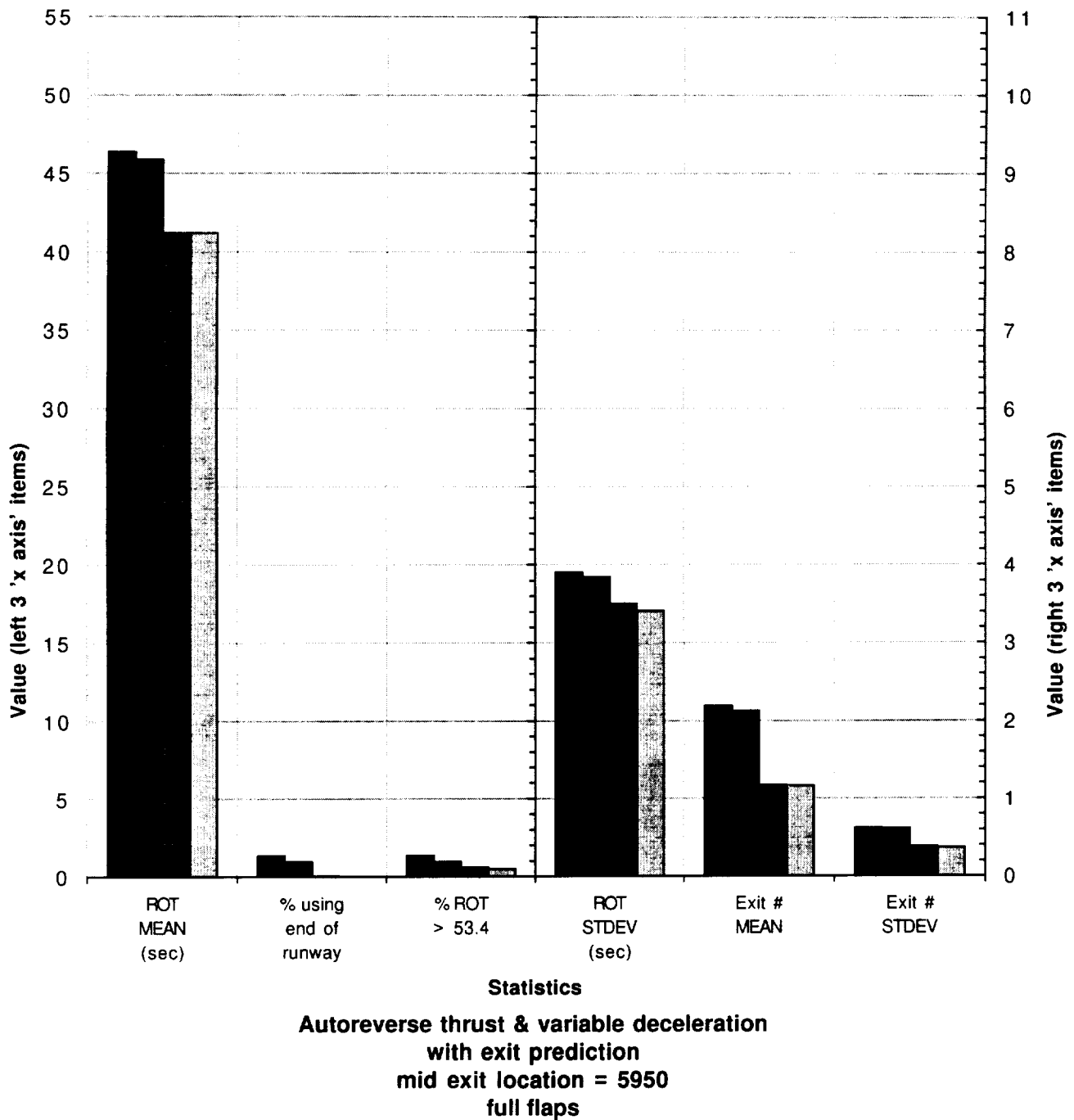
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
wide exit separation

■ MD-11; wet surface condition; Table data row 21

■ MD-11; dry surface condition; Table data row 22

■ MD-81; wet surface condition; Table data row 23

▨ MD-81; dry surface condition; Table data row 24

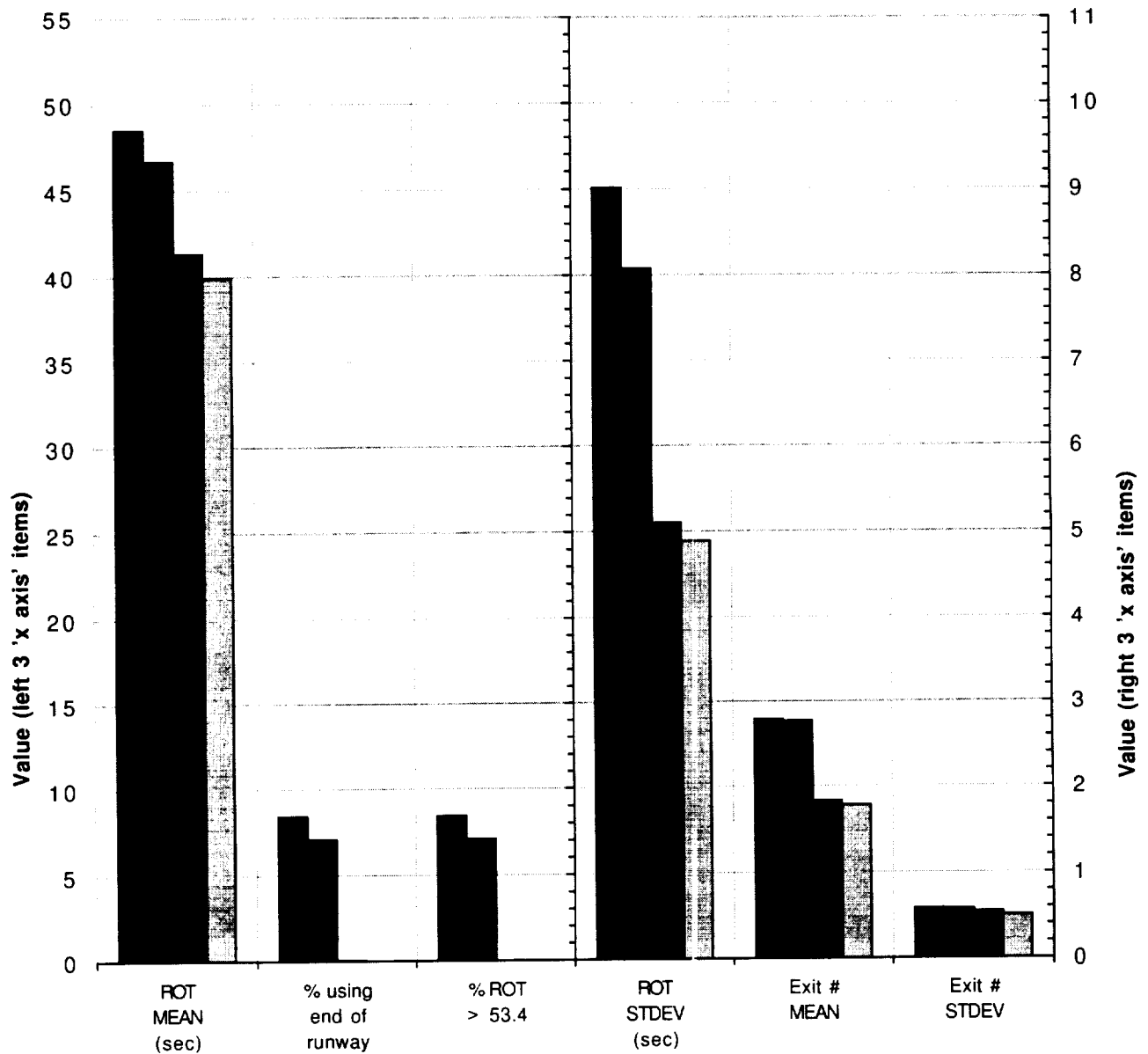


■ MD-11; wet surface condition; Table data row 26

■ MD-11; dry surface condition; Table data row 27

■ MD-81; wet surface condition; Table data row 28

■ MD-81; dry surface condition; Table data row 29



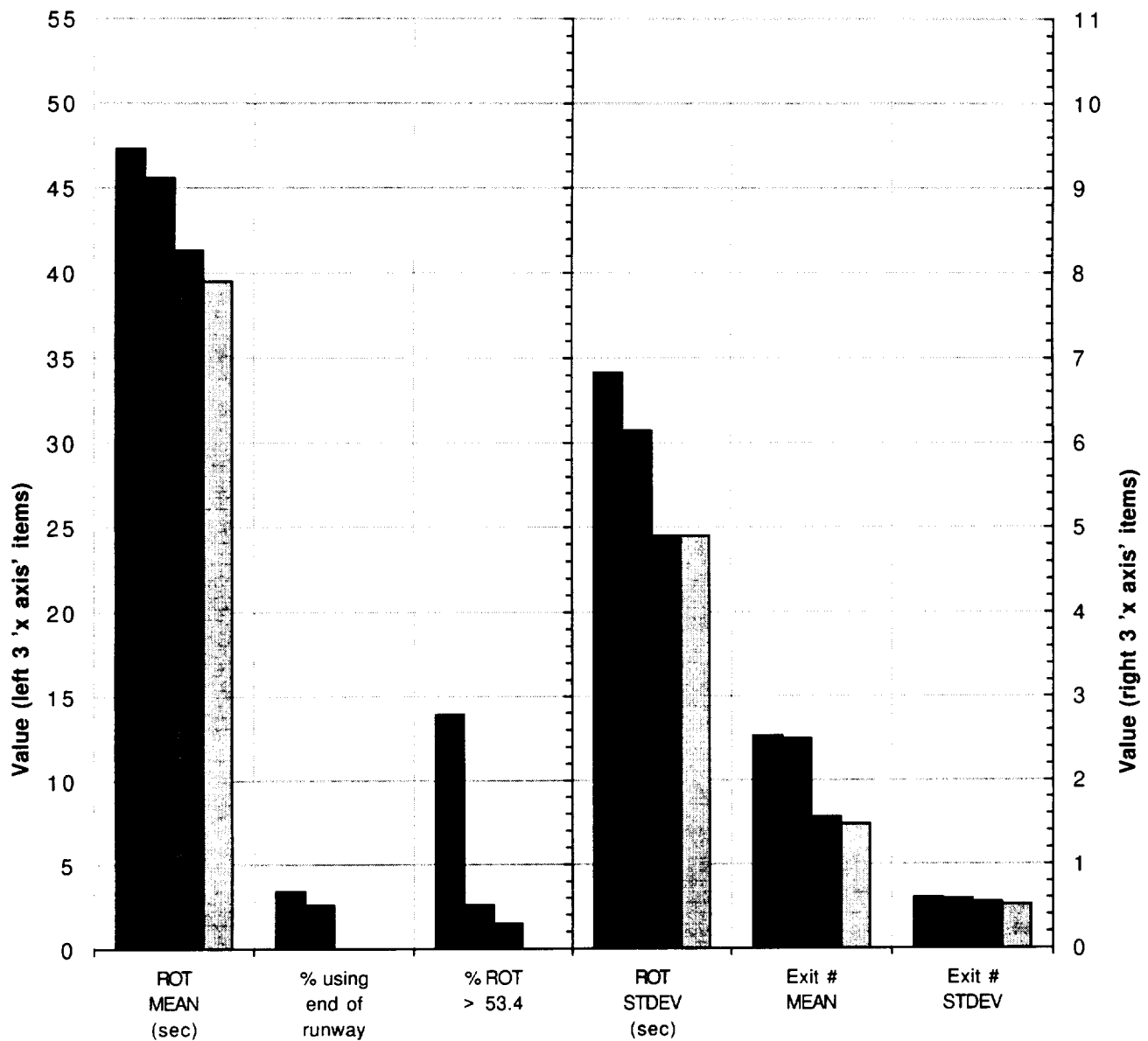
Statistics
Immediate med const reverse thrust & immed. const 6.5 decel
NO exit prediction
mid exit location = 4950

■ MD-11; wet surface condition; Table data row 31

■ MD-11; dry surface condition; Table data row 32

■ MD-81; wet surface condition; Table data row 33

■ MD-81; dry surface condition; Table data row 34



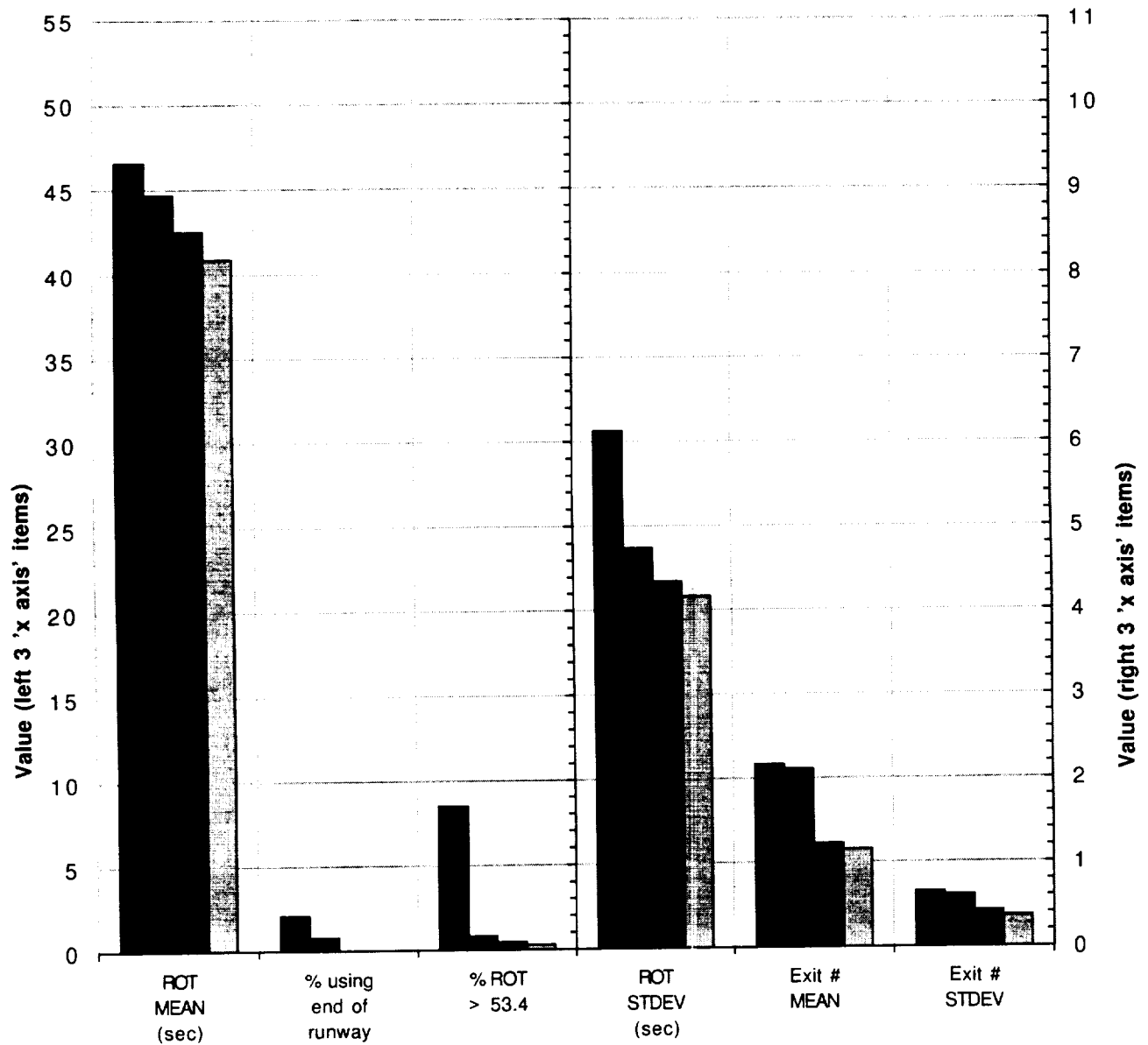
Statistics
Immediate med const reverse thrust & immed const 6.5 decel
NO exit prediction
mid exit location = 5350

■ MD-11; wet surface condition; Table data row 36

■ MD-11; dry surface condition; Table data row 37

■ MD-81; wet surface condition; Table data row 38

■ MD-81; dry surface condition; Table data row 39



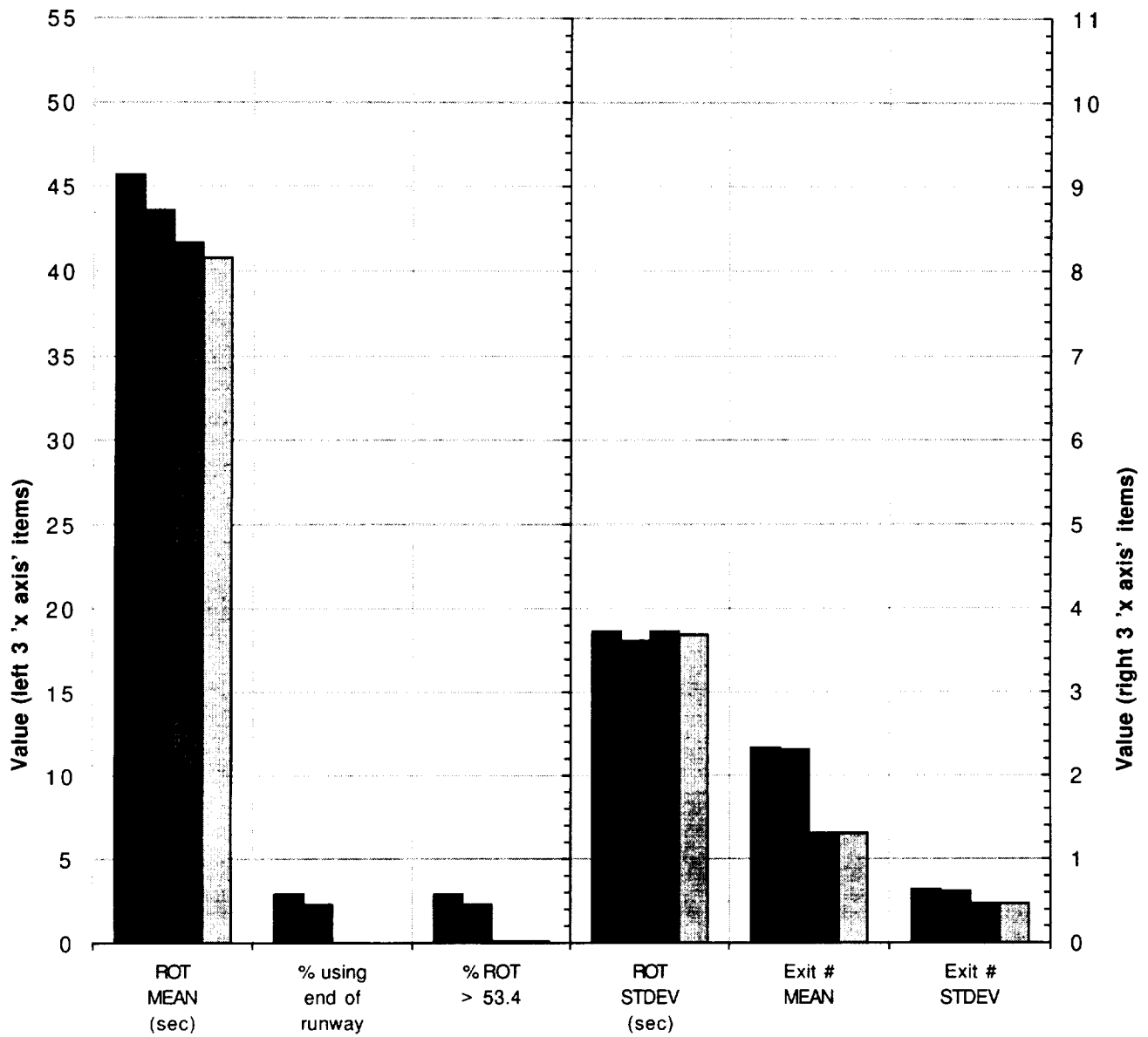
Statistics
Immediate med const reverse thrust & immed. const 6.5 decel
NO exit prediction
mid exit location = 5950

■ MD-11; wet surface condition; Table data row 41

■ MD-11; dry surface condition; Table data row 42

■ MD-81; wet surface condition; Table data row 43

▨ MD-81; dry surface condition; Table data row 44



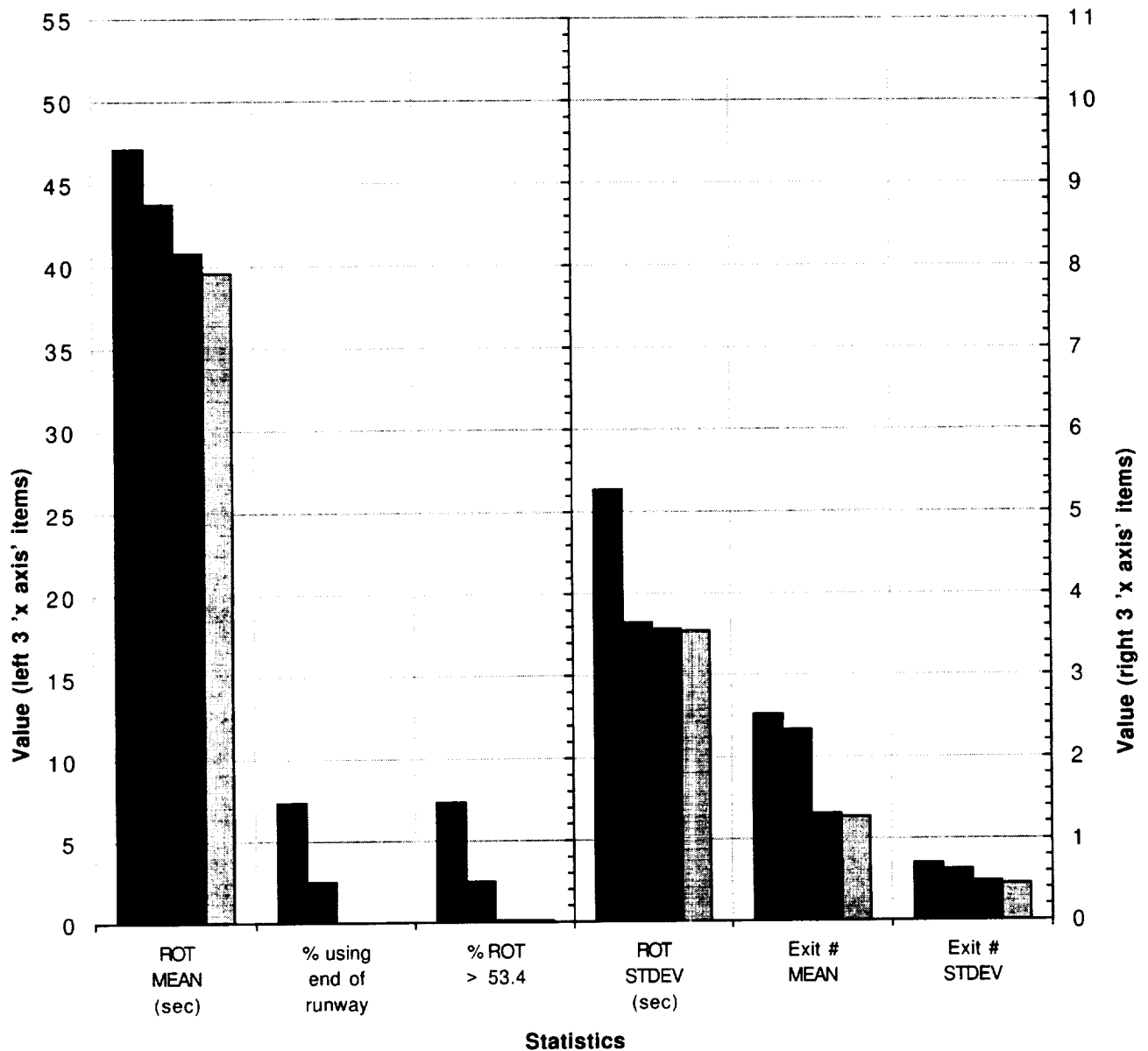
Statistics
Constant reverse thrust & roll-constant 6.5 decel
with exit prediction
mid exit location = 5950

■ MD-11; wet surface condition; Table data row 46

■ MD-11; dry surface condition; Table data row 47

■ MD-81; wet surface condition; Table data row 48

■ MD-81; dry surface condition; Table data row 49



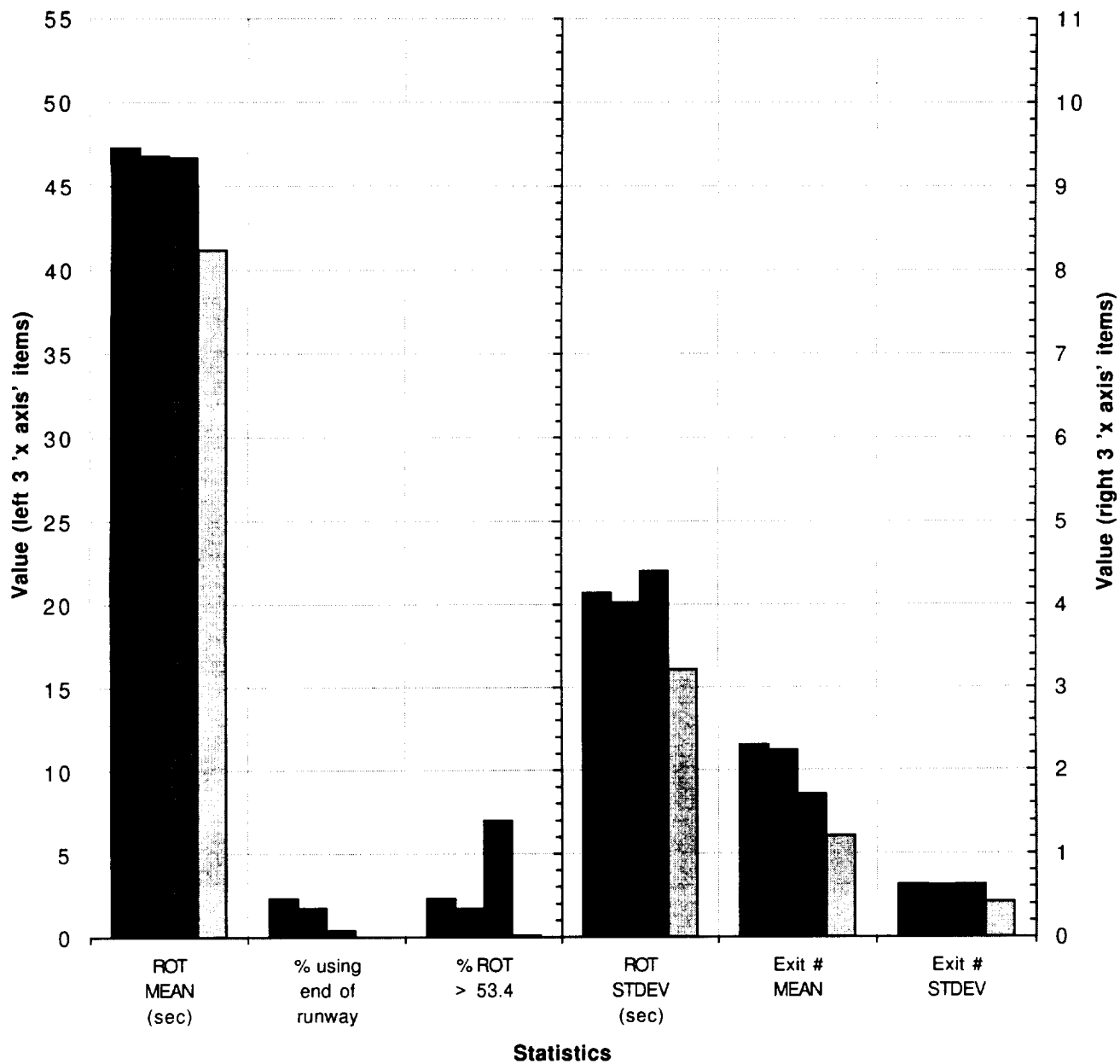
**Autoreverse thrust & roll-constant 5.5 deceleration
with exit prediction
mid exit location = 5950**

■ MD-11; wet surface condition; Table data row 51

■ MD-11; dry surface condition; Table data row 52

■ MD-81; wet surface condition; Table data row 53

▨ MD-81; dry surface condition; Table data row 54



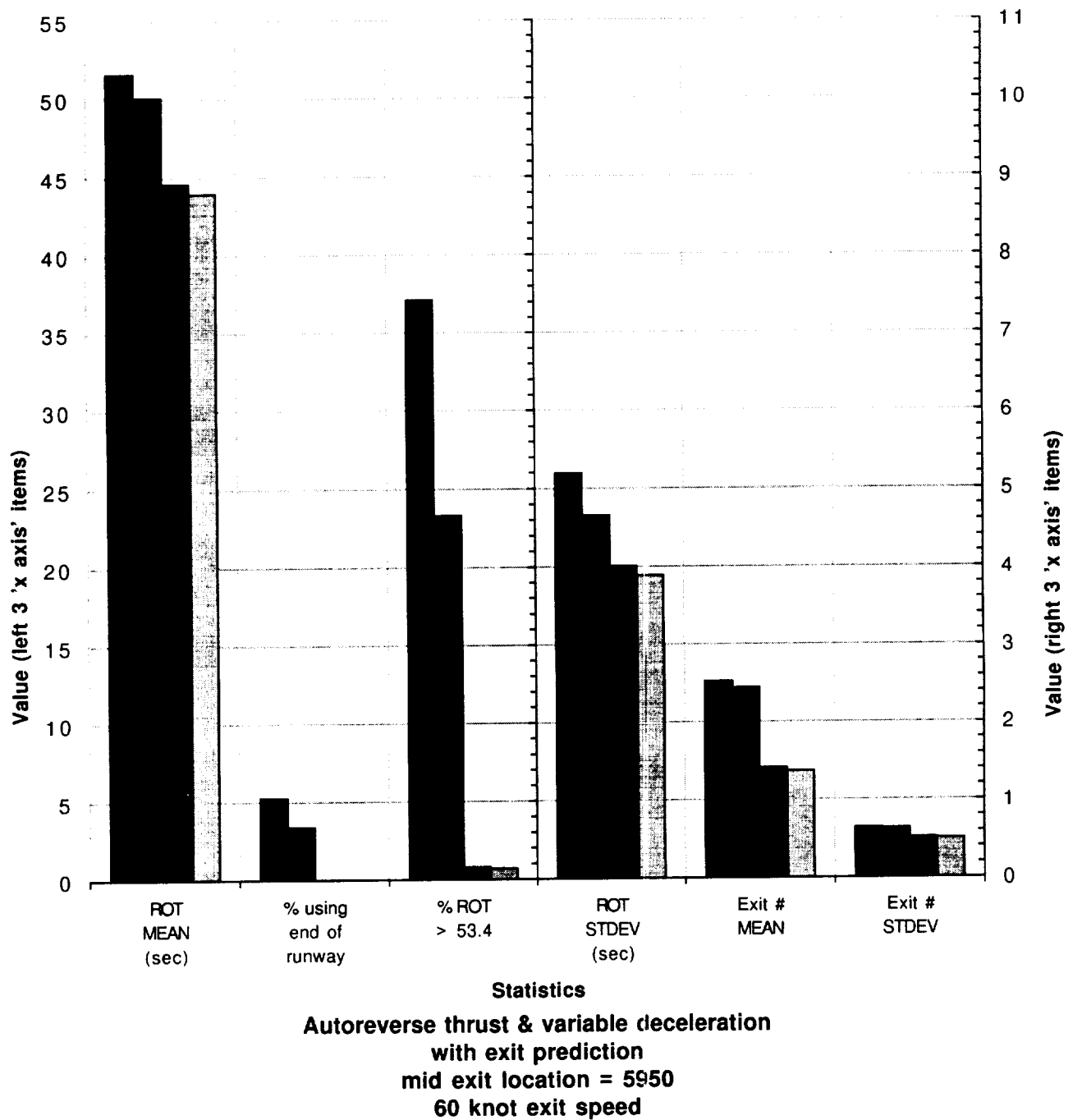
Constant reverse thrust & variable deceleration with exit prediction
mid exit location = 5950

■ MD-11; wet surface condition; Table data row 56

■ MD-11; dry surface condition; Table data row 57

■ MD-81; wet surface condition; Table data row 58

□ MD-81; dry surface condition; Table data row 59

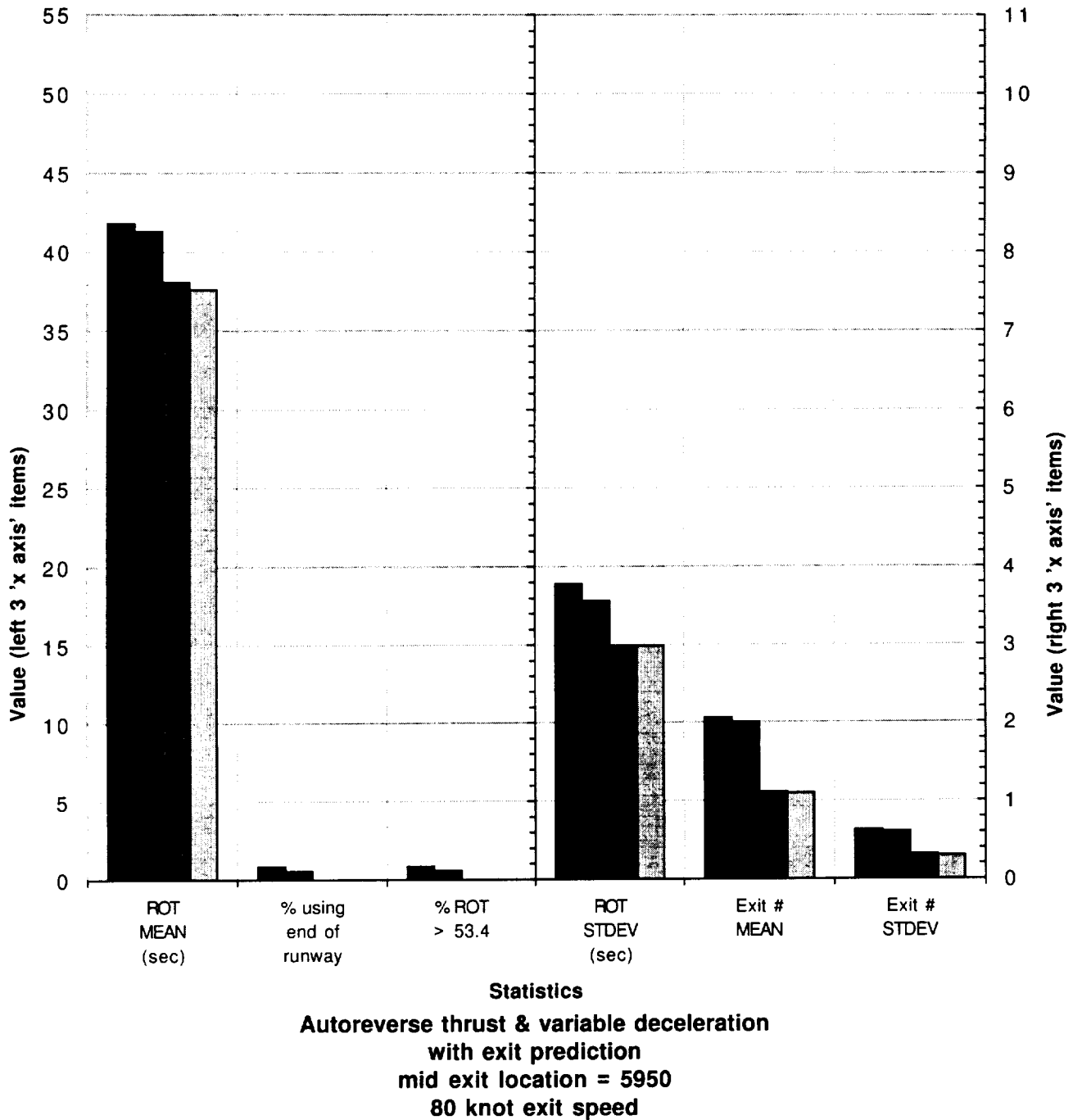


■ MD-11; wet surface condition; Table data row 61

■ MD-11; dry surface condition; Table data row 62

■ MD-81; wet surface condition; Table data row 63

■ MD-81; dry surface condition; Table data row 64

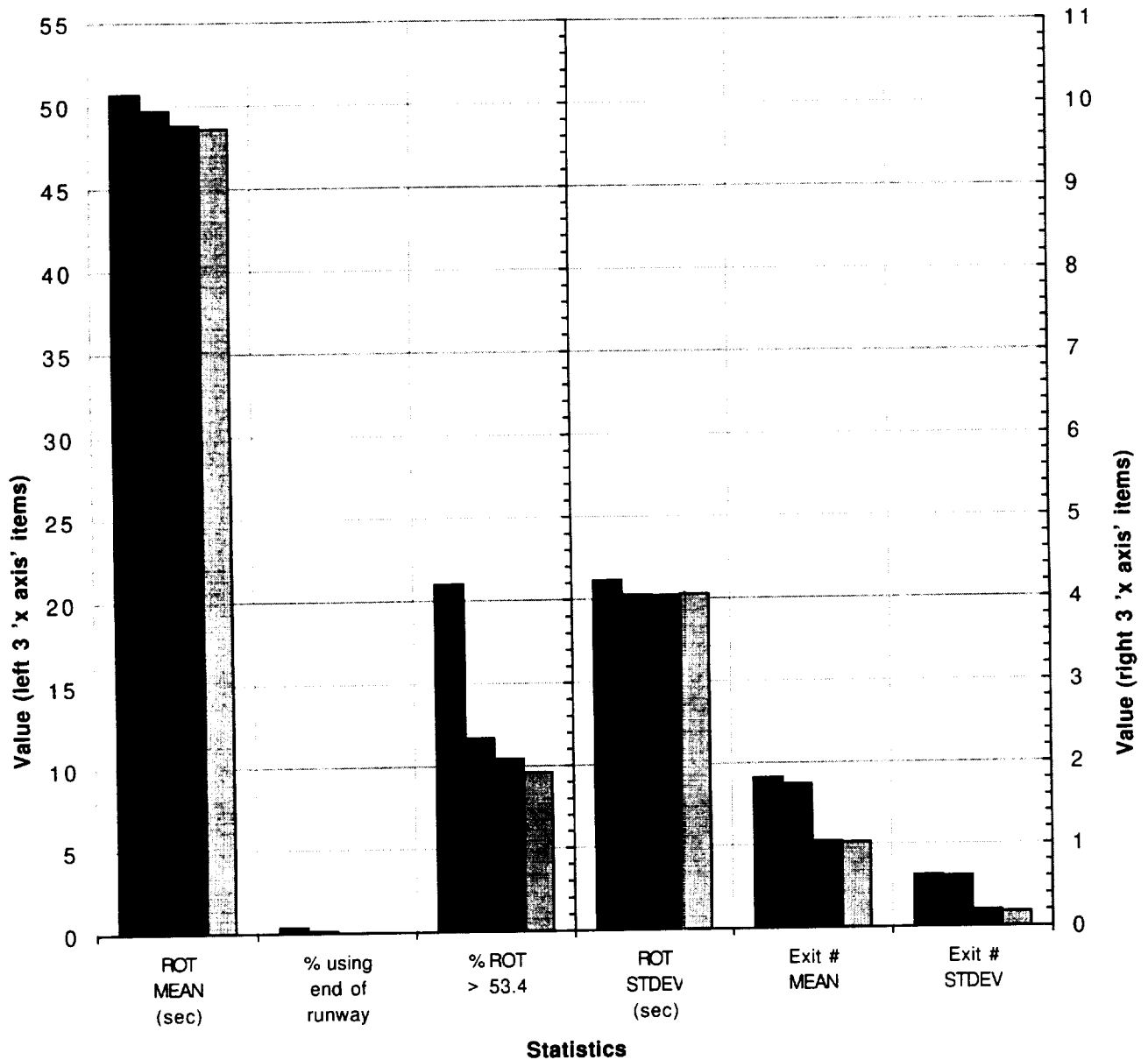


■ MD-11; wet surface condition; Table data row 66

■ MD-11; dry surface condition; Table data row 67

■ MD-81; wet surface condition; Table data row 68

■ MD-81; dry surface condition; Table data row 69



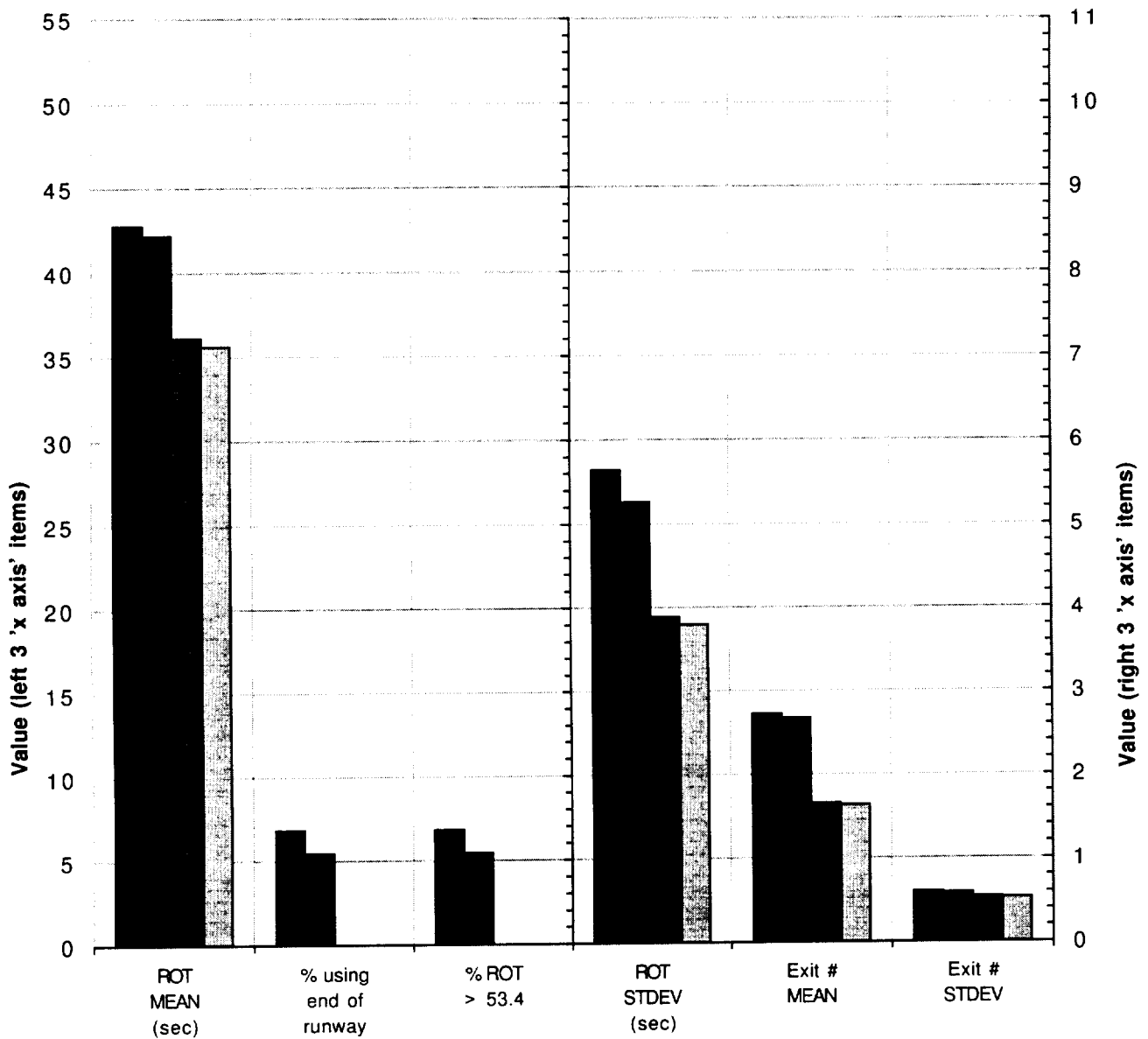
**Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 6950
60 knot exit speed**

■ MD-11; wet surface condition; Table data row 71

■ MD-11; dry surface condition; Table data row 72

■ MD-81; wet surface condition; Table data row 73

□ MD-81; dry surface condition; Table data row 74



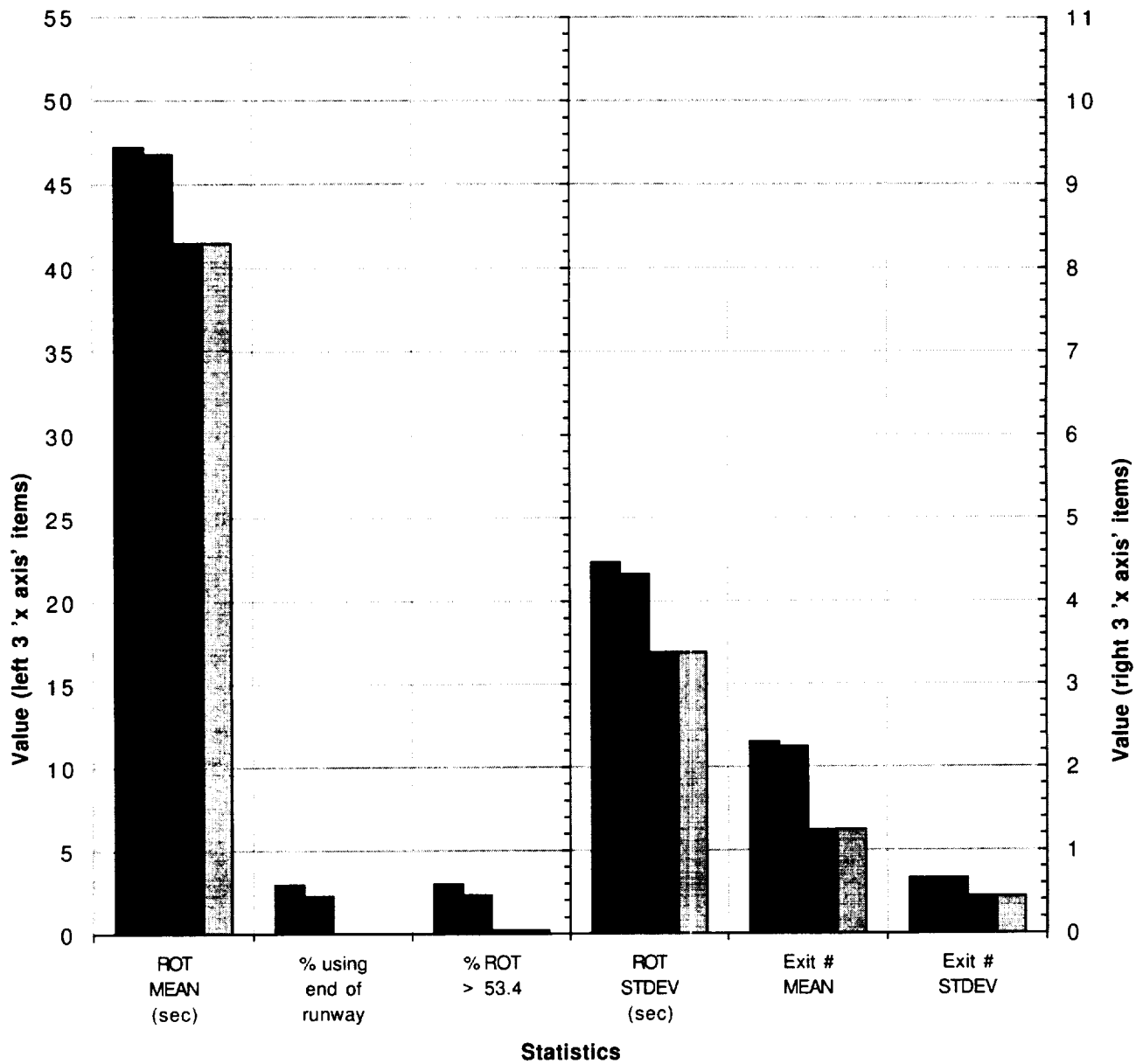
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 4950
80 knot exit speed

■ MD-11; wet surface condition; Table data row 76

■ MD-11; dry surface condition; Table data row 77

■ MD-81; wet surface condition; Table data row 78

■ MD-81; dry surface condition; Table data row 79



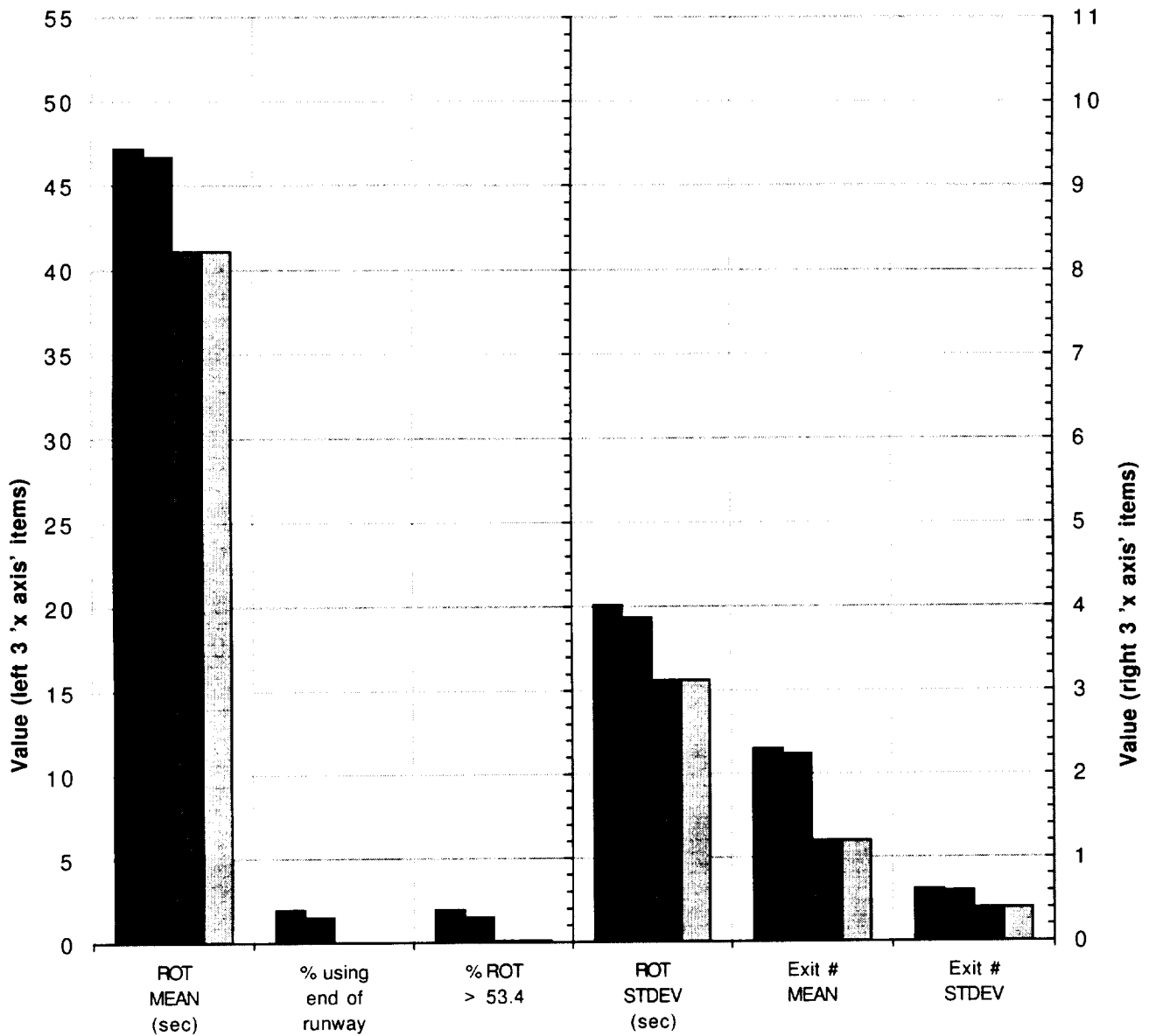
**Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
TD dispersion sigma=375**

■ MD-11; wet surface condition; Table data row 81

■ MD-11; dry surface condition; Table data row 82

■ MD-81; wet surface condition; Table data row 83

□ MD-81; dry surface condition; Table data row 84



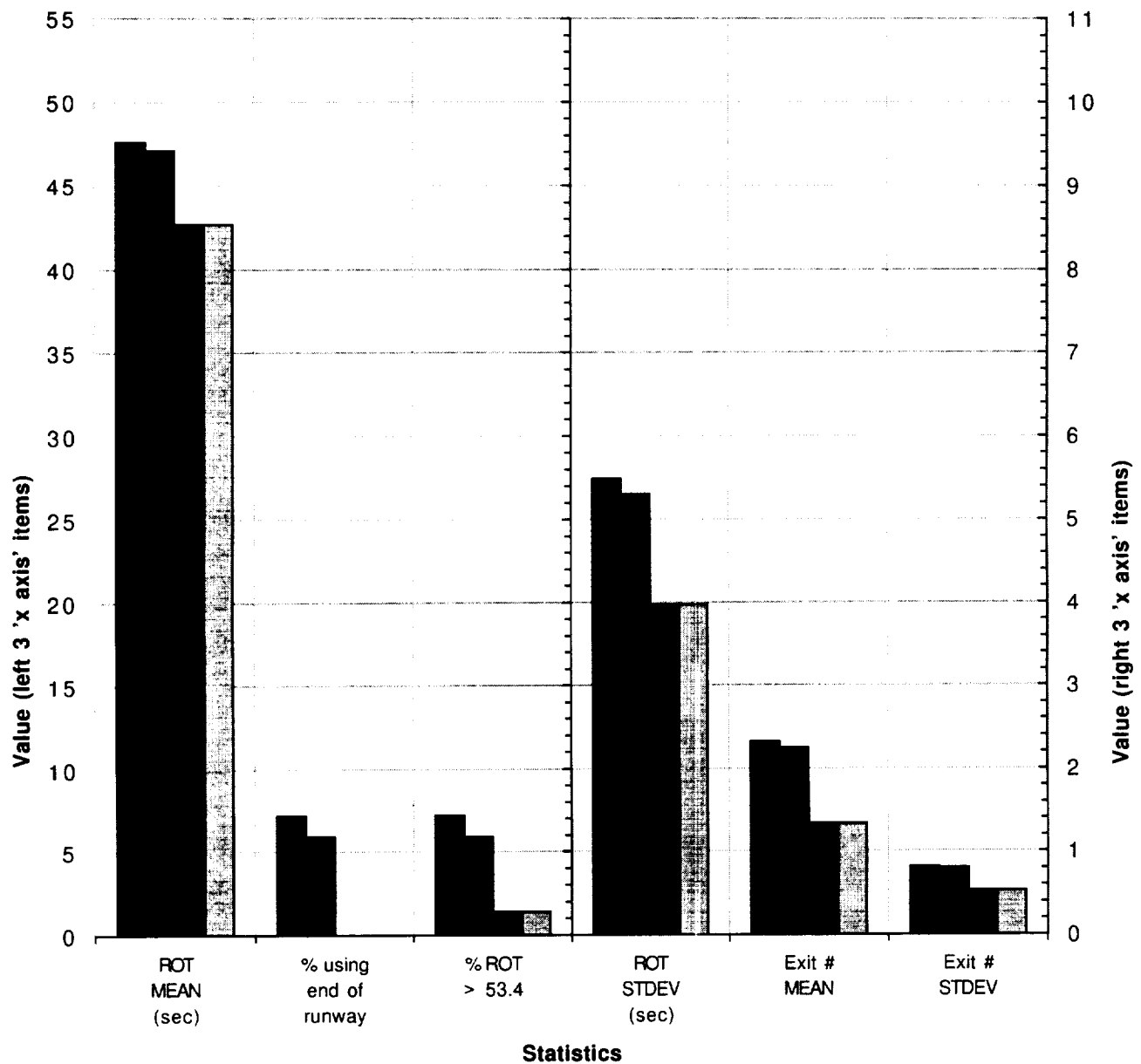
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
TD dispersion sigma=100

■ MD-11; wet surface condition; Table data row 86

■ MD-11; dry surface condition; Table data row 87

■ MD-81; wet surface condition; Table data row 88

▨ MD-81; dry surface condition; Table data row 89



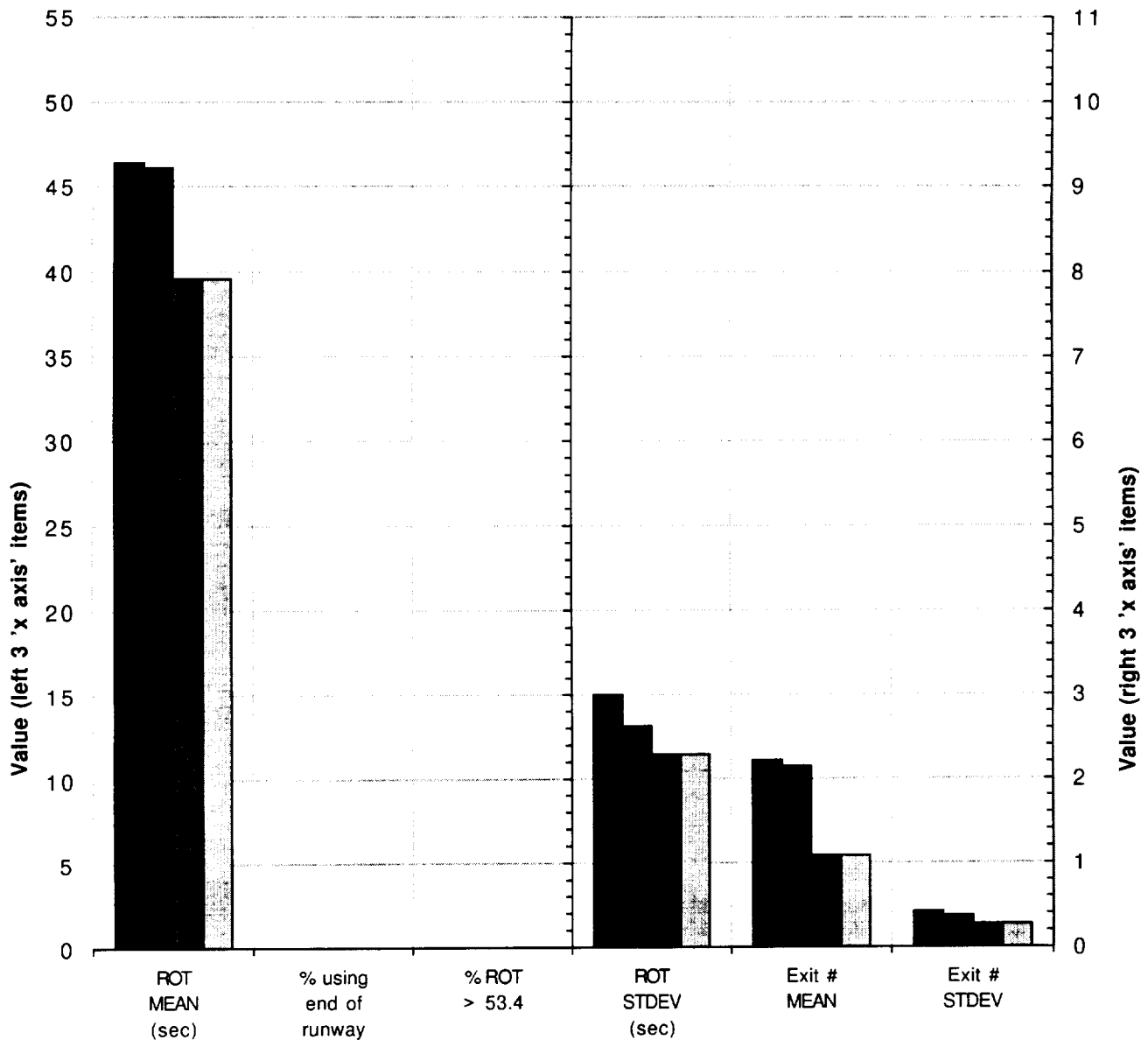
**Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
TD gnd speed sigma=17**

■ MD-11; wet surface condition; Table data row 91

■ MD-11; dry surface condition; Table data row 92

■ MD-81; wet surface condition; Table data row 93

□ MD-81; dry surface condition; Table data row 94



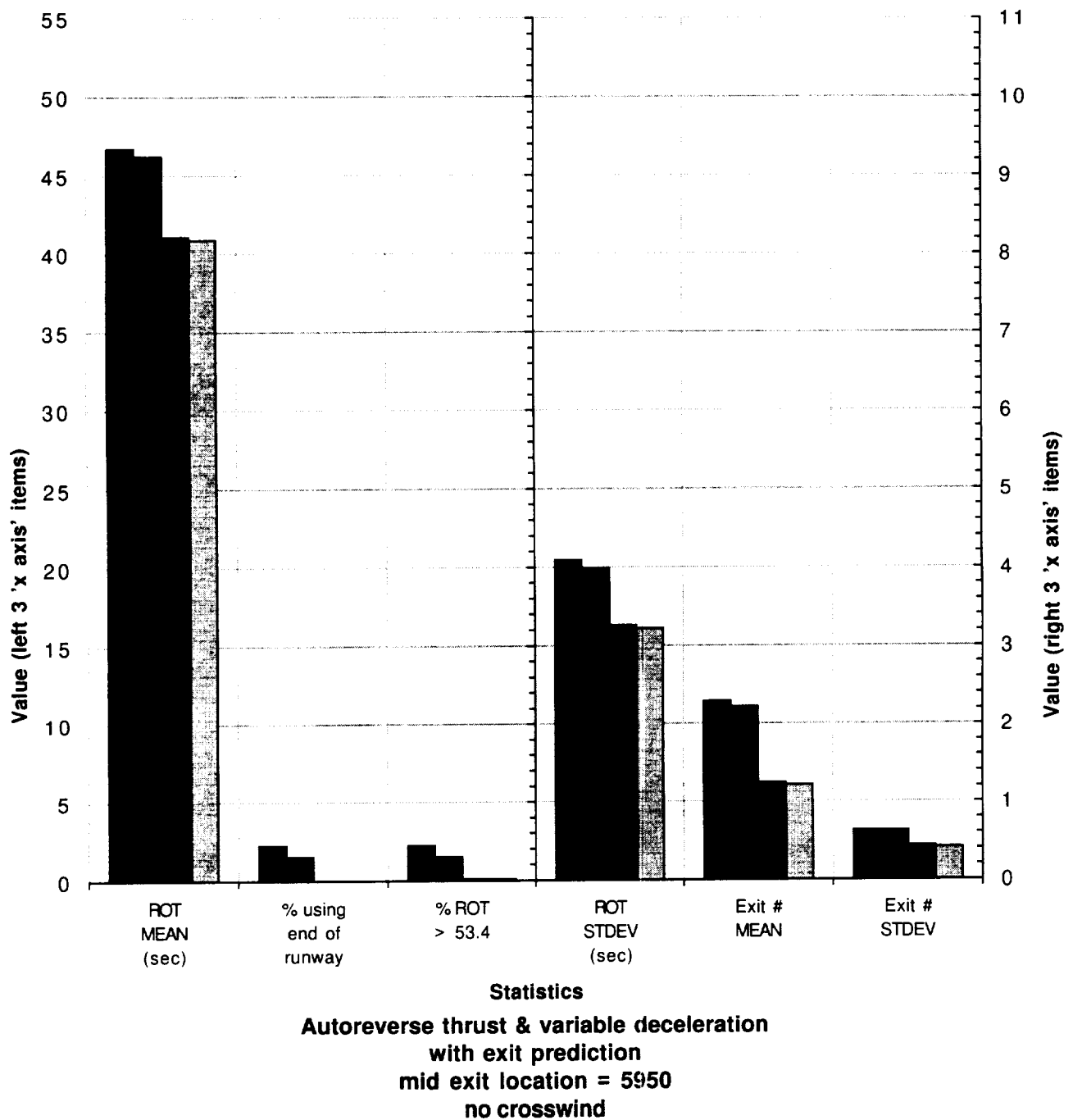
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
TD gnd speed sigma=5

■ MD-11; wet surface condition; Table data row 96

■ MD-11; dry surface condition; Table data row 97

■ MD-81; wet surface condition; Table data row 98

▨ MD-81; dry surface condition; Table data row 99

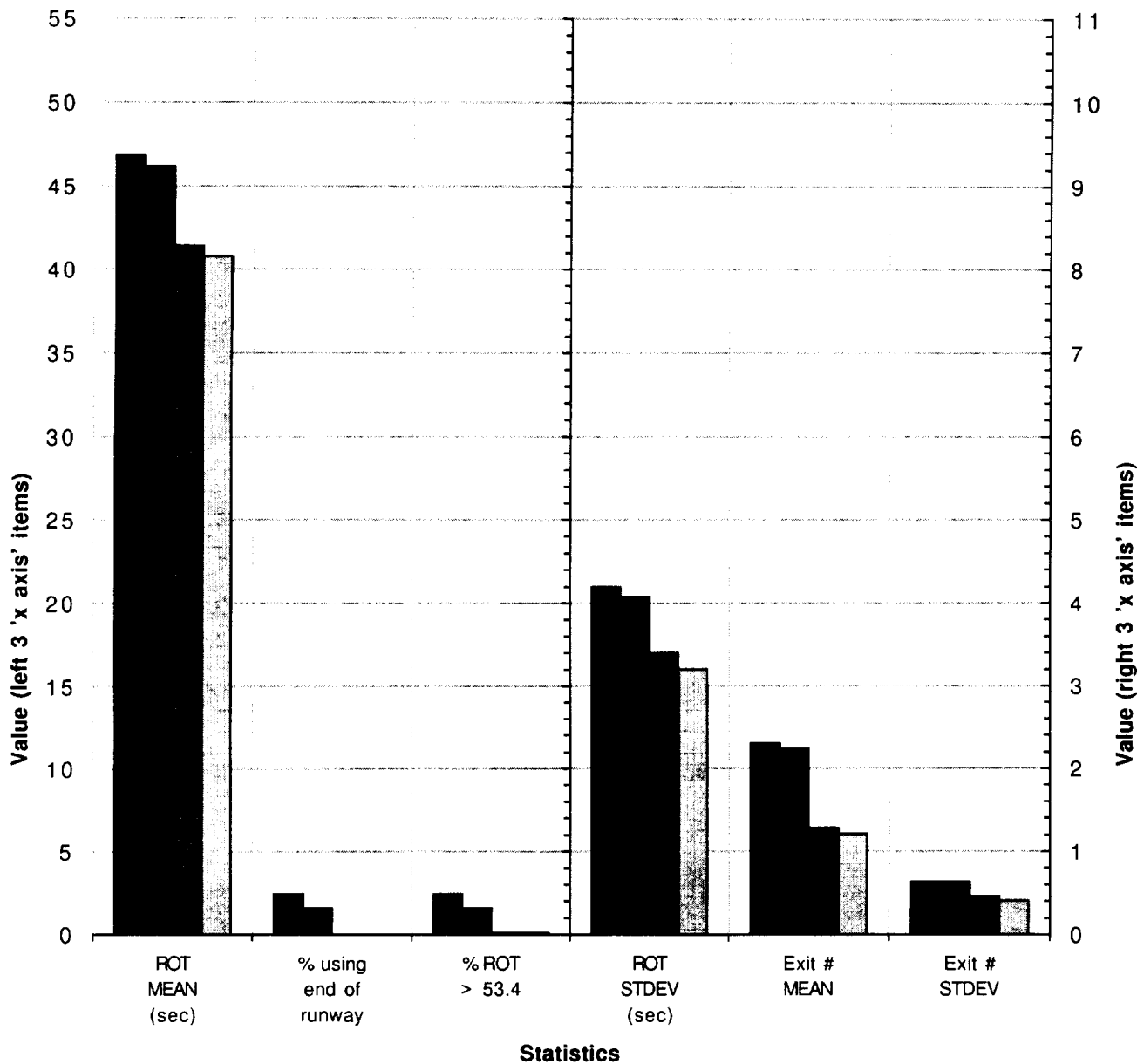


■ MD-11; wet surface condition; Table data row 101

■ MD-11; dry surface condition; Table data row 102

■ MD-81; wet surface condition; Table data row 103

■ MD-81; dry surface condition; Table data row 104



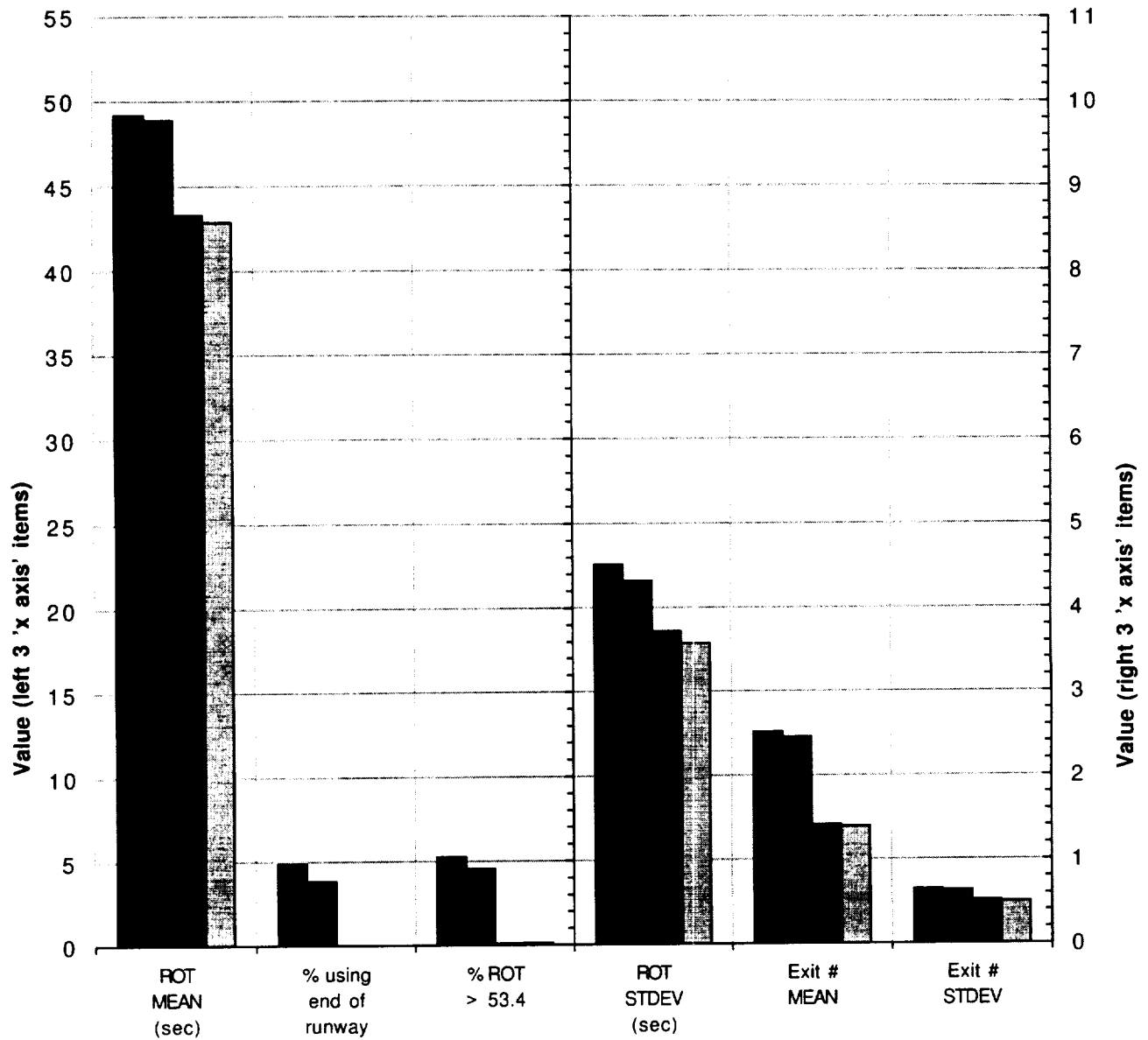
**Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
gusting crosswind 12.5 +2.5sigma, sensor noise**

■ MD-11; wet surface condition; Table data row 106

■ MD-11; dry surface condition; Table data row 107

■ MD-81; wet surface condition; Table data row 108

▨ MD-81; dry surface condition; Table data row 109



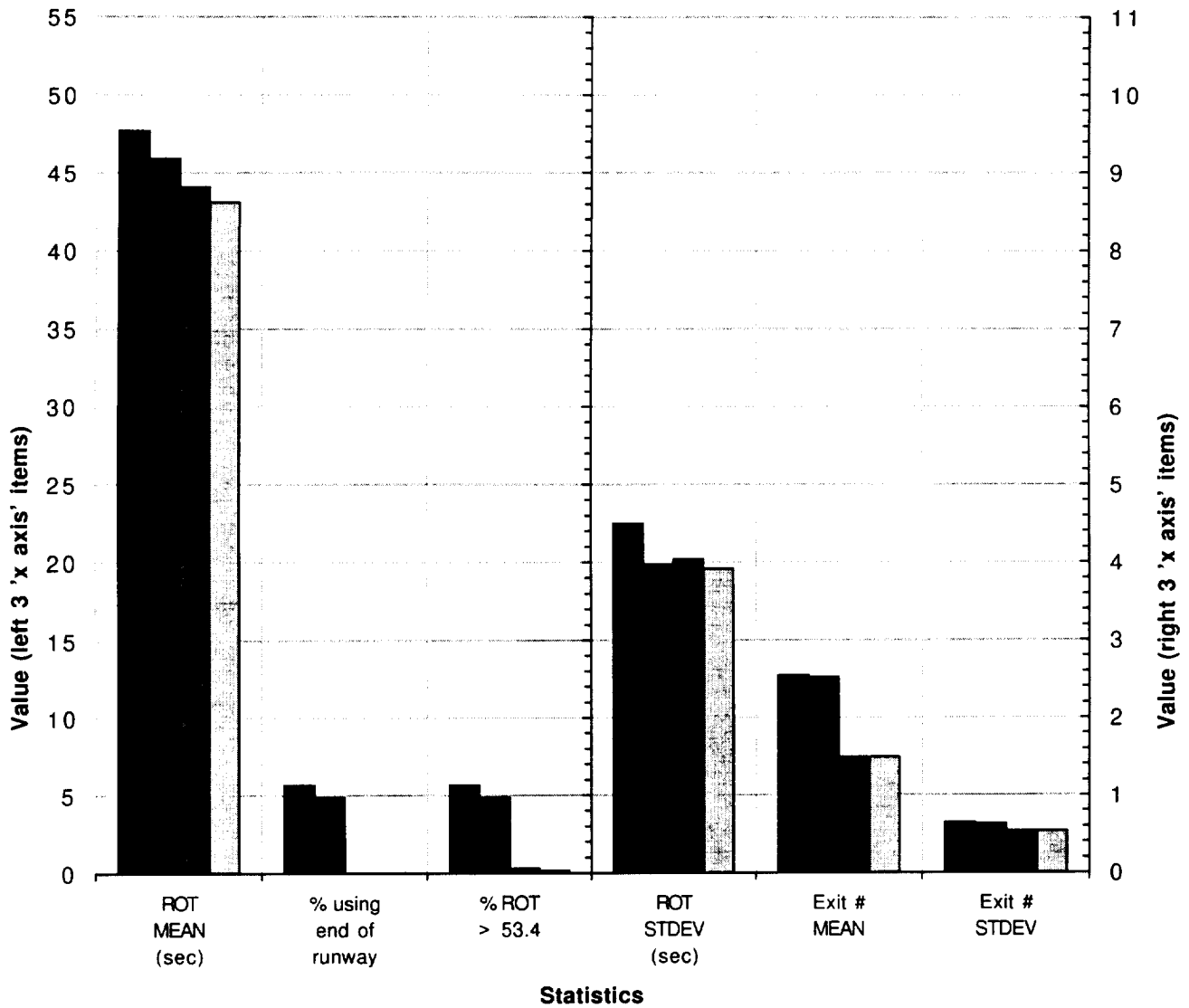
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950
predict TD location error of 300 feet

■ MD-11; wet surface condition; Table data row 111

■ MD-11; dry surface condition; Table data row 112

■ MD-81; wet surface condition; Table data row 113

▨ MD-81; dry surface condition; Table data row 114



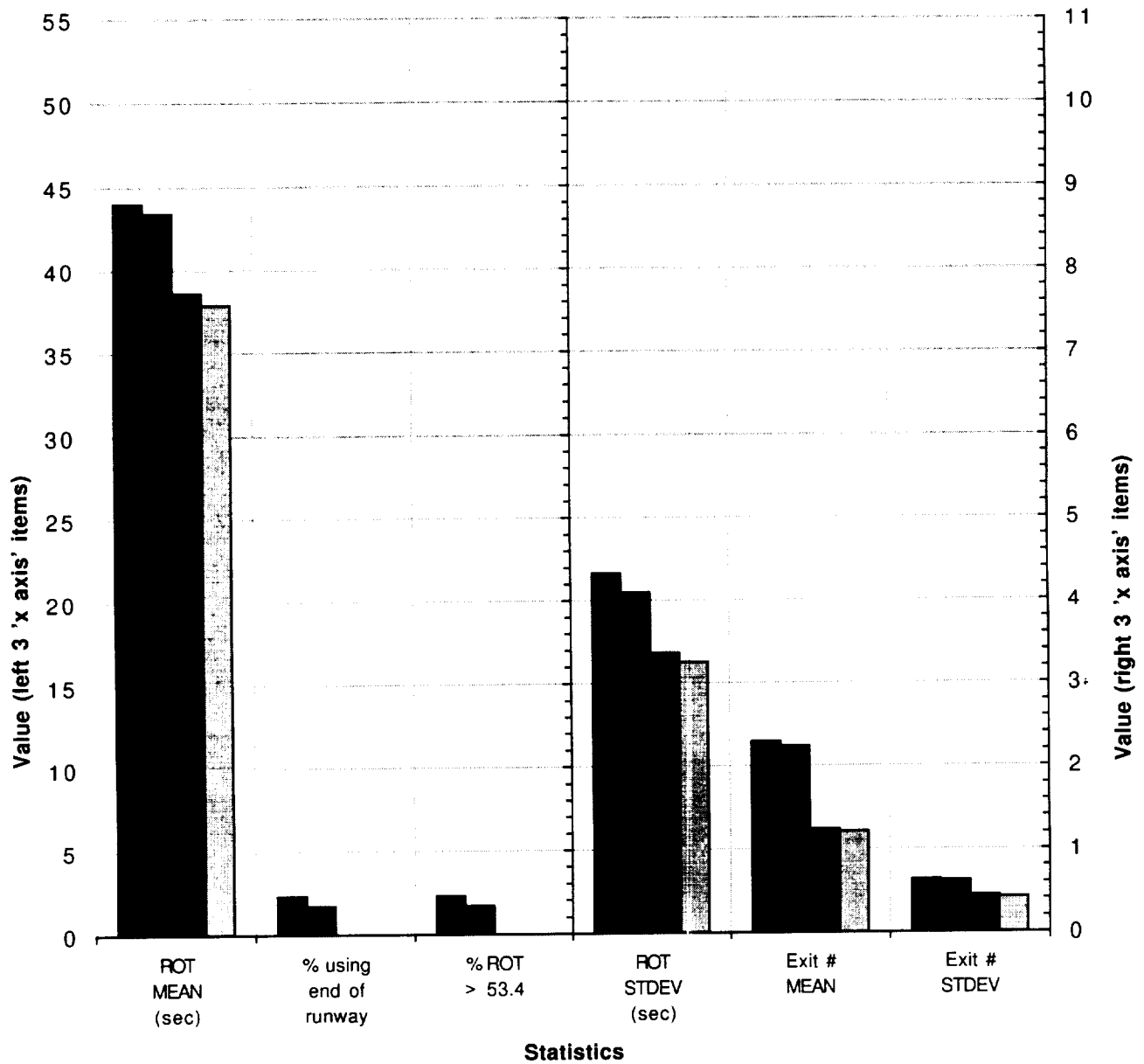
Constant reverse thrust & roll-constant 6.5 deceleration
with exit prediction
mid exit location = 5950
predict TD location error of 300 feet

■ MD-11; wet surface condition; Table data row 116

■ MD-11; dry surface condition; Table data row 117

■ MD-81; wet surface condition; Table data row 118

▨ MD-81; dry surface condition; Table data row 119



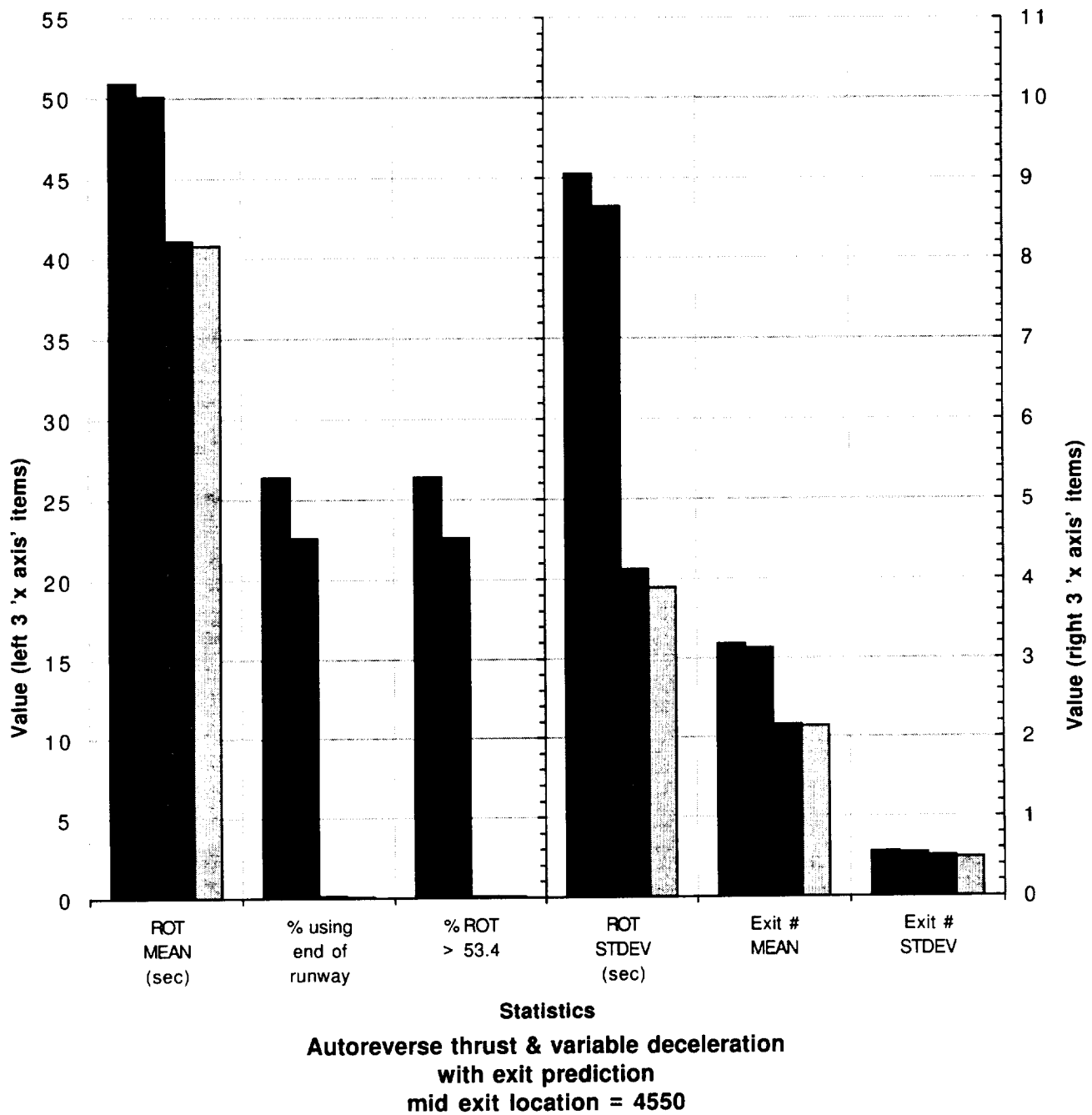
**Autoreverse thrust & variable deceleration
with exit prediction
constant 2900 ft exit radius
mid exit location = 5950**

■ MD-11; wet surface condition; Table data row 121

■ MD-11; dry surface condition; Table data row 122

■ MD-81; wet surface condition; Table data row 123

■ MD-81; dry surface condition; Table data row 124

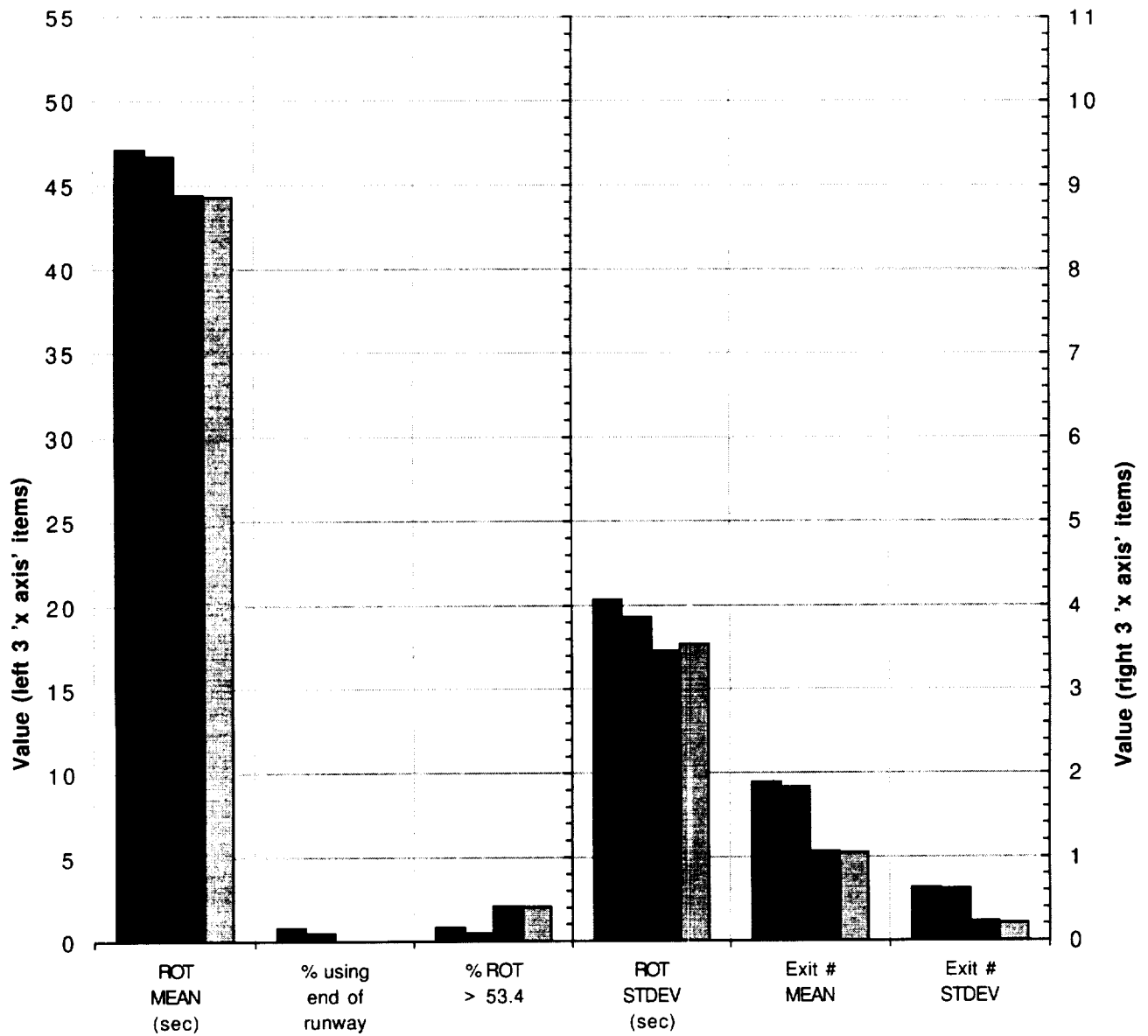


■ MD-11; wet surface condition; Table data row 126

■ MD-11; dry surface condition; Table data row 127

■ MD-81; wet surface condition; Table data row 128

▨ MD-81; dry surface condition; Table data row 129



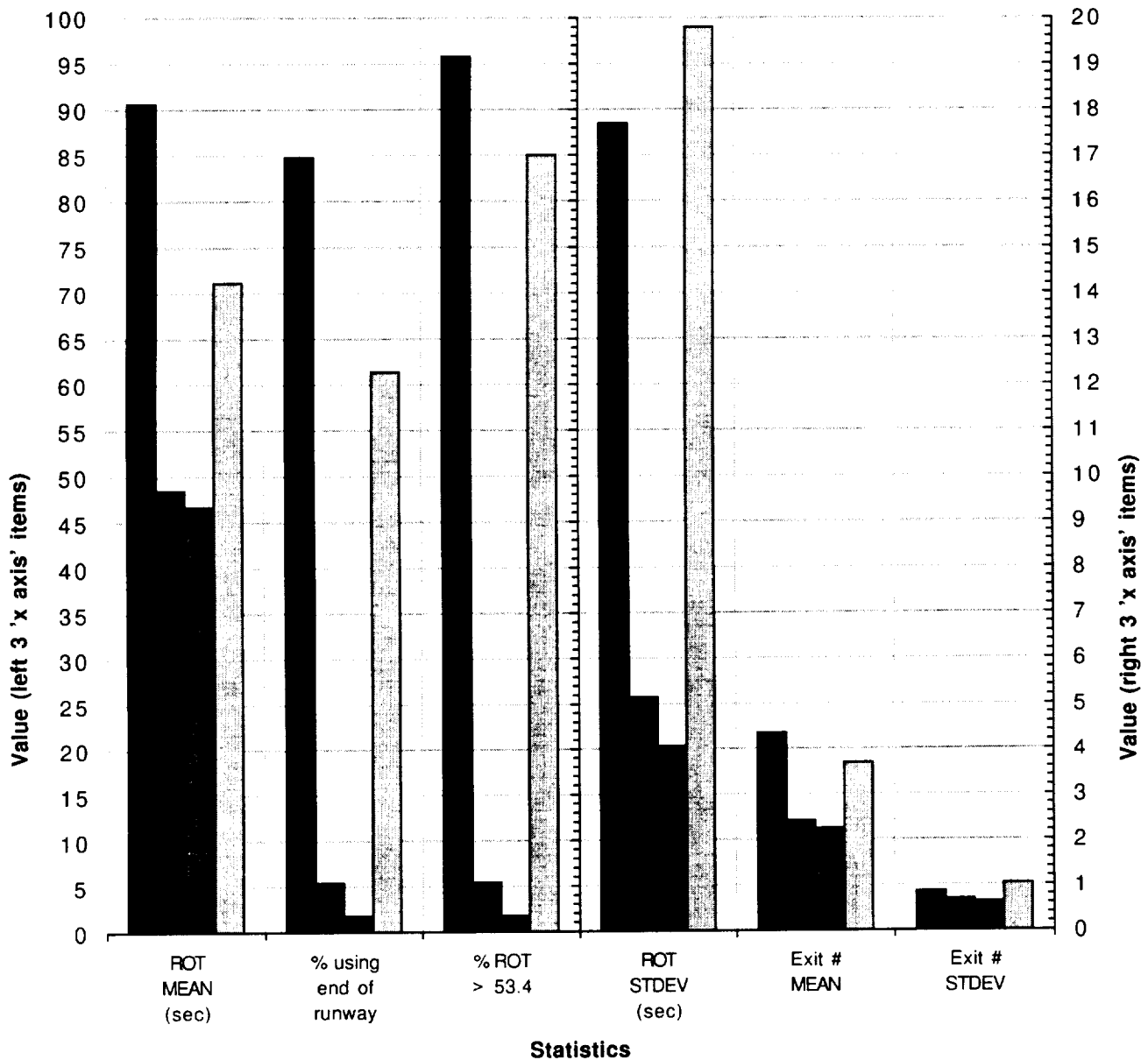
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 6550

■ MD-11; ice surface condition; Table data row 131

■ MD-11; snow surface condition; Table data row 132

■ MD-11; slush surface condition; Table data row 133

▨ MD-11; flood surface condition; Table data row 134



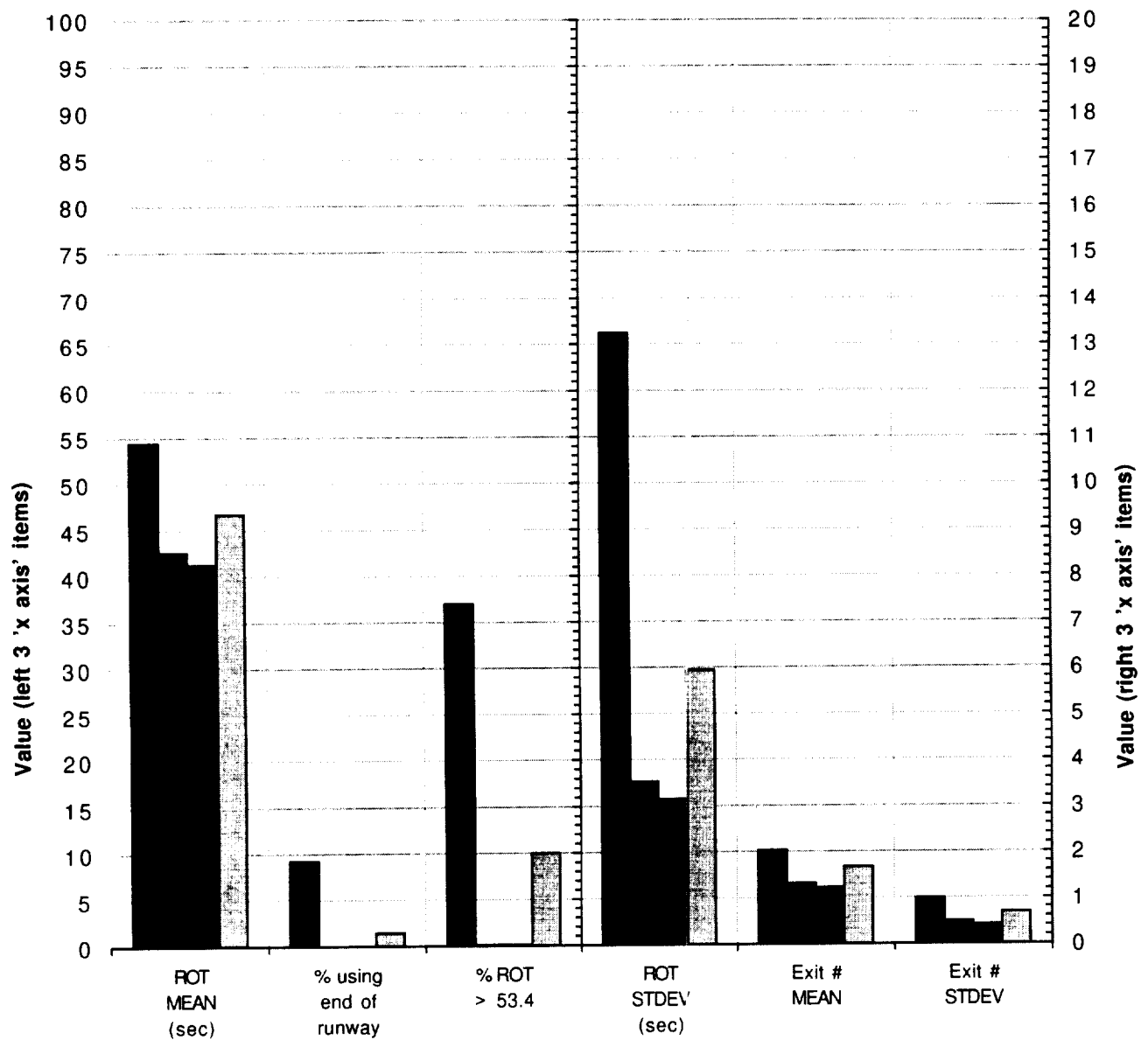
**MD-11 on various surface conditions
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950**

■ MD-81; ice surface condition; Table data row 136

■ MD-81; snow surface condition; Table data row 137

■ MD-81; slush surface condition; Table data row 138

□ MD-81; flood surface condition; Table data row 139



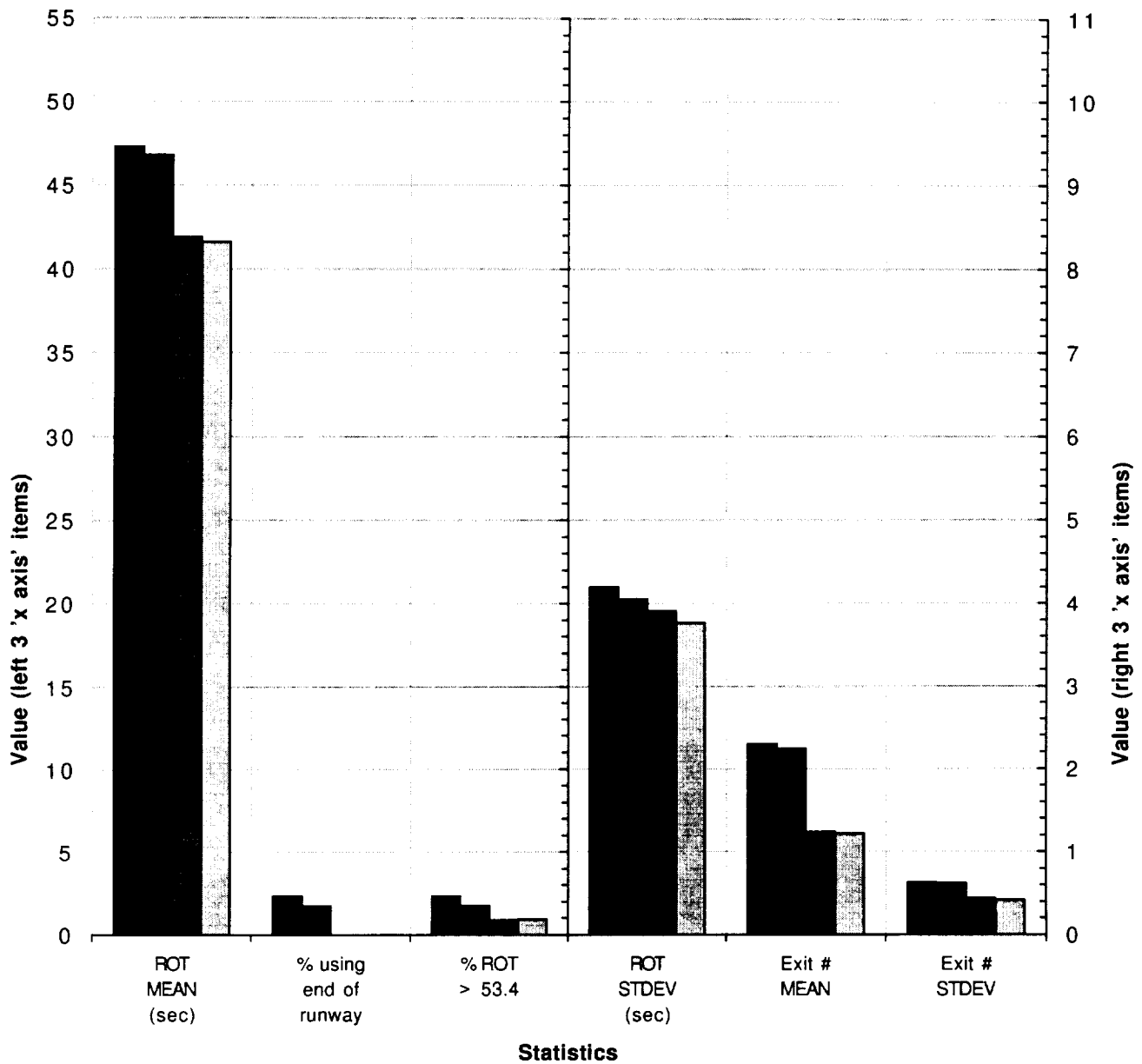
Statistics
MD-81 on various surface conditions
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950

■ MD-11; wet surface condition; Table data row 141

■ MD-11; dry surface condition; Table data row 142

■ MD-81; wet surface condition; Table data row 143

■ MD-81; dry surface condition; Table data row 144



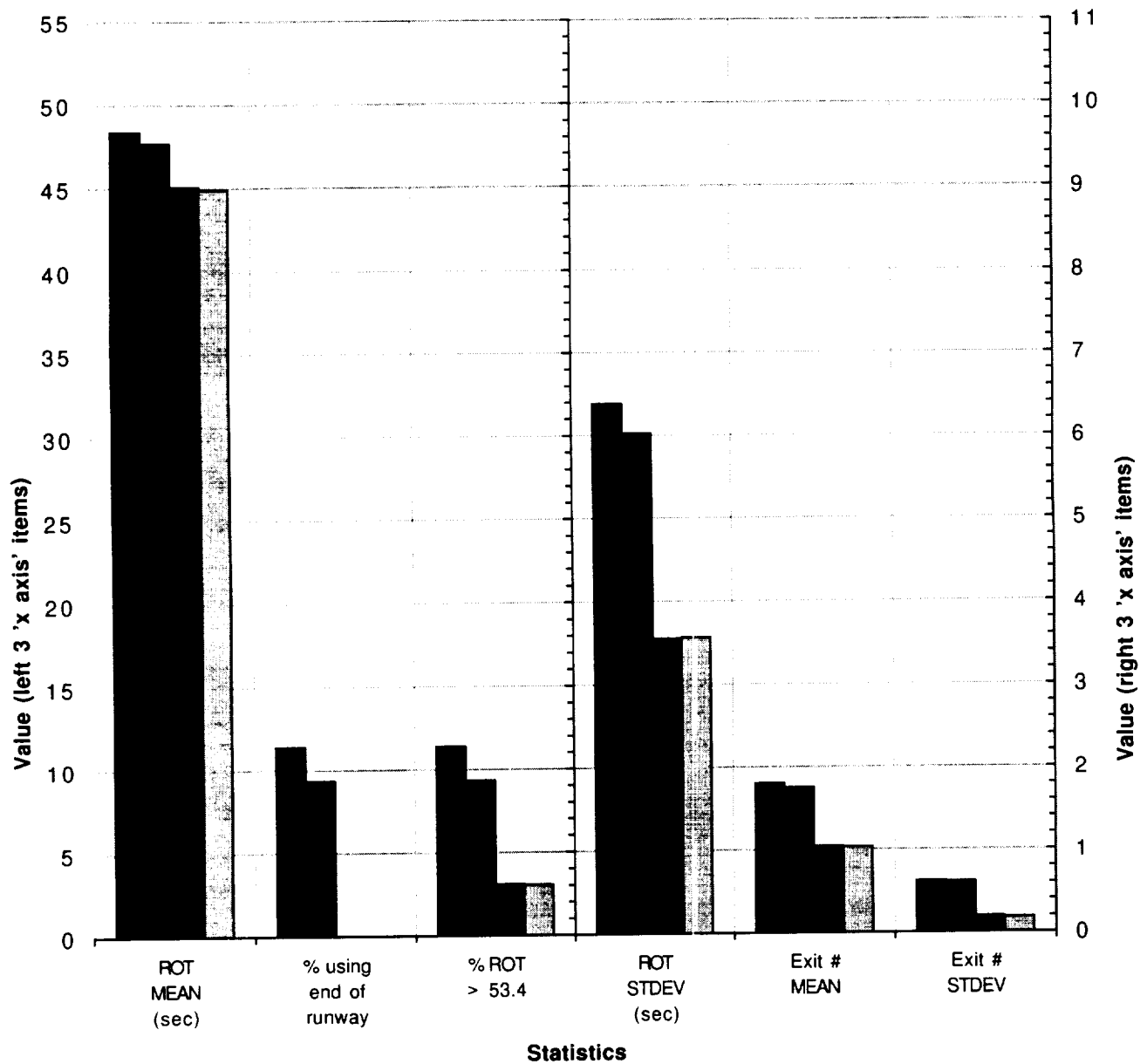
**Reverse Thrust not stowed, idle on exit
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location = 5950**

■ MD-11; wet surface condition; Table data row 146

■ MD-11; dry surface condition; Table data row 147

■ MD-81; wet surface condition; Table data row 148

□ MD-81; dry surface condition; Table data row 149



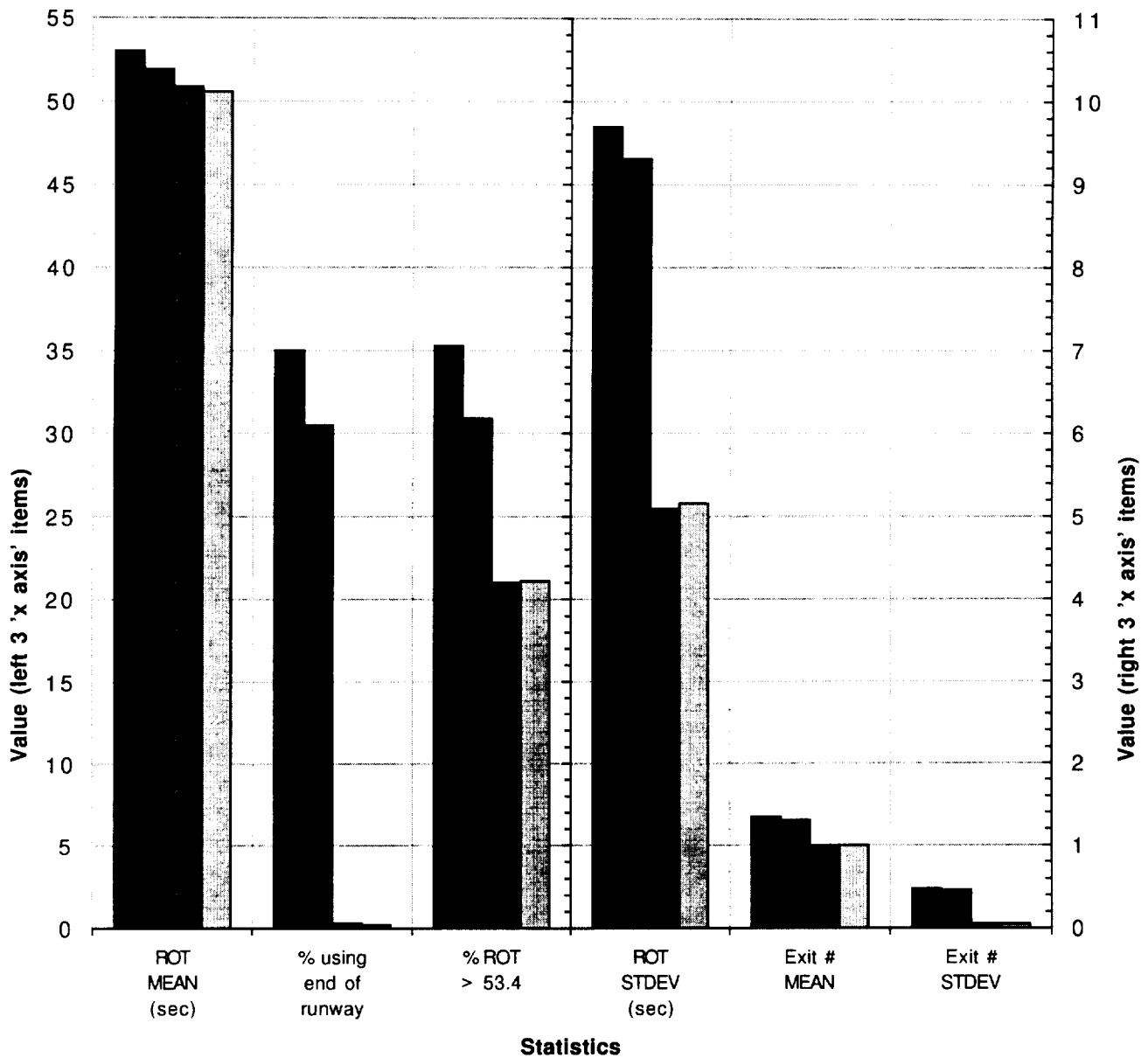
**2 high-speed exit locations at 5225 & 6650 feet
Autoreverse thrust & variable deceleration
with exit prediction**

■ MD-11; wet surface condition; Table data row 151

■ MD-11; dry surface condition; Table data row 152

■ MD-81; wet surface condition; Table data row 153

▨ MD-81; dry surface condition; Table data row 154



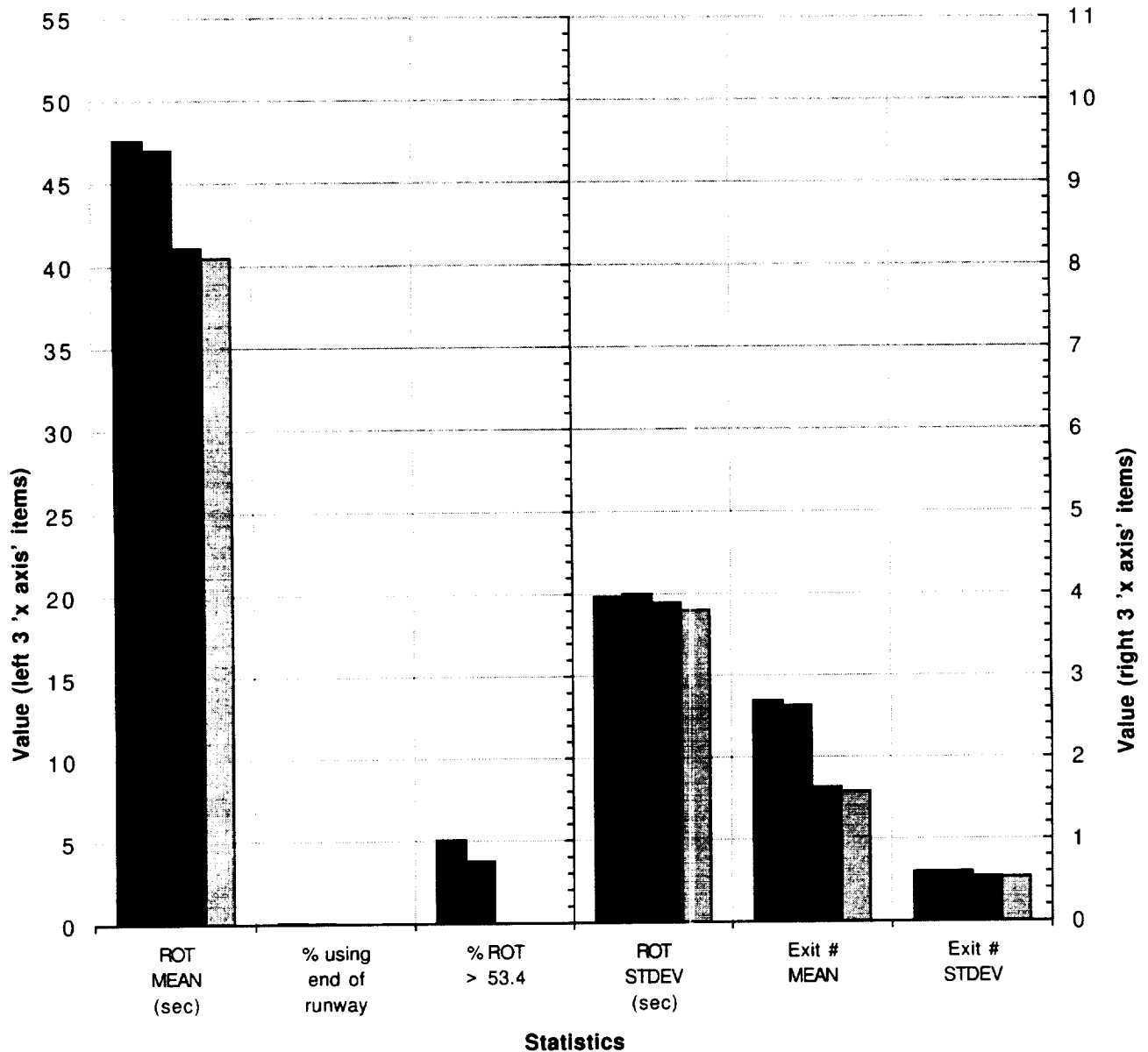
**1 high-speed exit location at 5950 feet
Autoreverse thrust & variable deceleration
with exit prediction**

■ MD-11; wet surface condition; Table data row 156

■ MD-11; dry surface condition; Table data row 157

■ MD-81; wet surface condition; Table data row 158

▨ MD-81; dry surface condition; Table data row 159



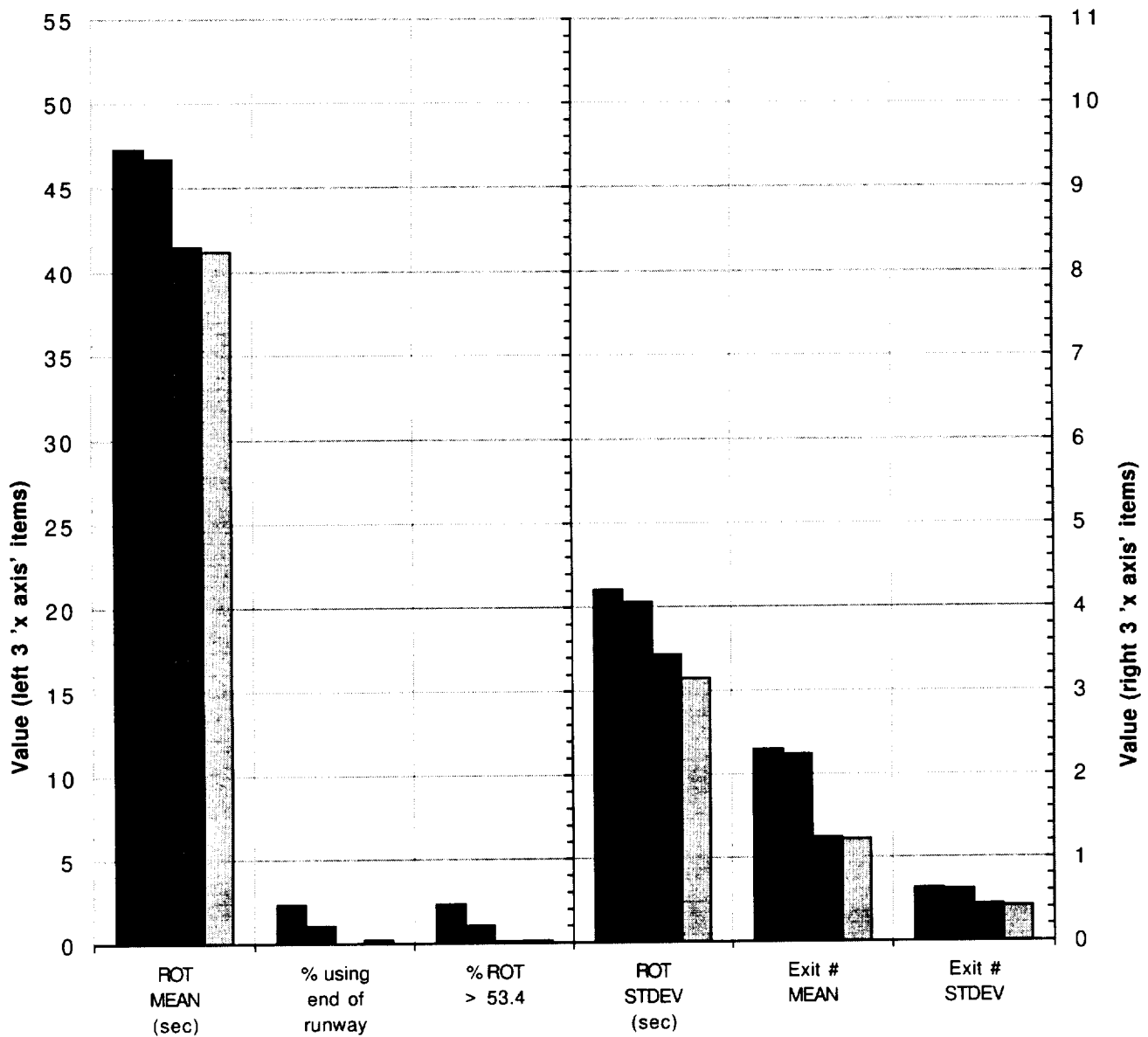
4th high-speed exit location at 8300 feet
with original mid exit location at 5350 feet
Autoreverse thrust & variable deceleration
with exit prediction

■ MD-11; wet surface condition; Table data row 161

■ MD-11; dry surface condition; Table data row 162

■ MD-81; wet surface condition; Table data row 163

■ MD-81; dry surface condition; Table data row 164



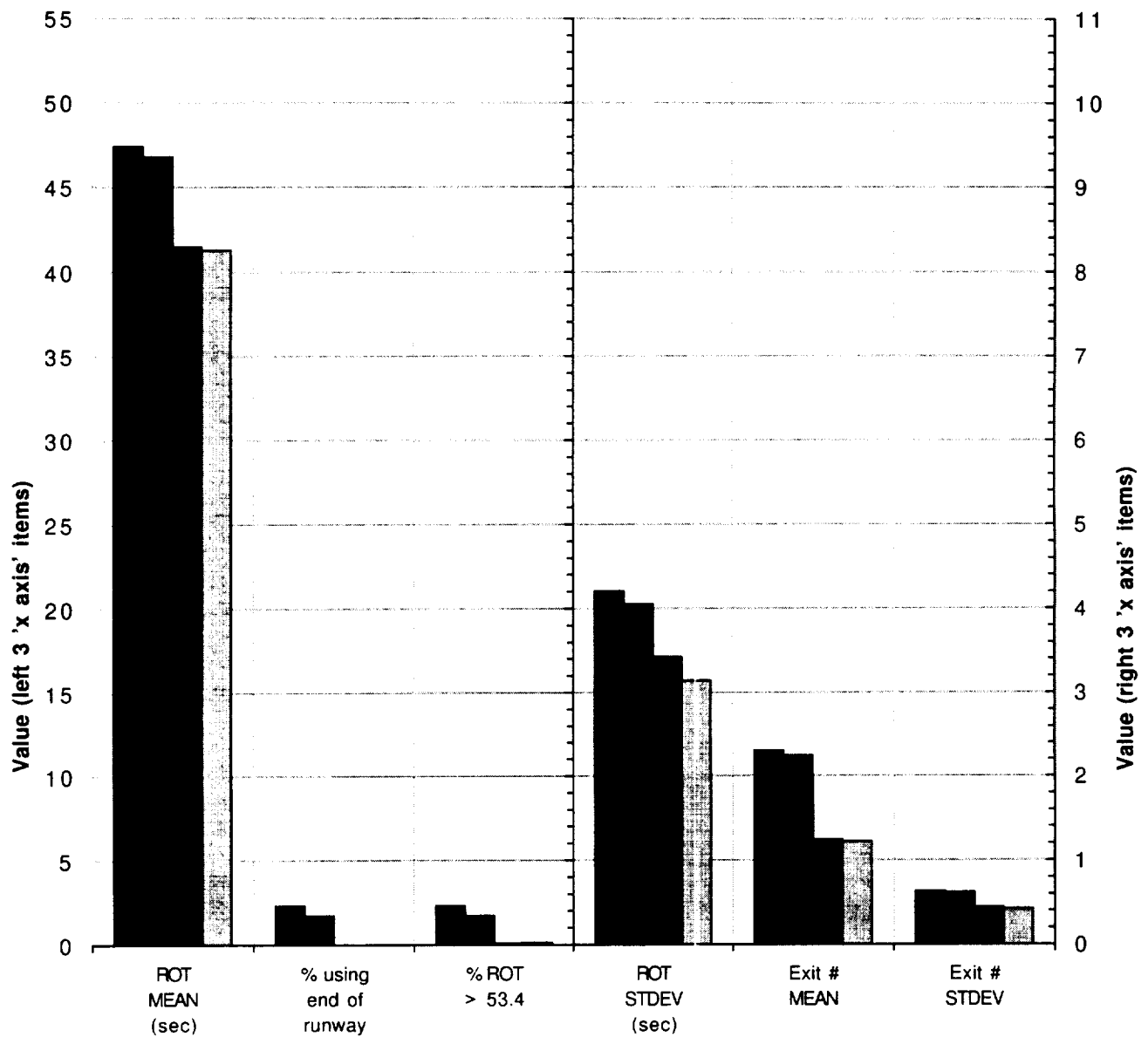
Statistics
Lateral touchdown offset of Y=27 feet
mid exit location at 5950
Autoreverse thrust & variable deceleration
with exit prediction

■ MD-11; wet surface condition; Table data row 166

■ MD-11; dry surface condition; Table data row 167

■ MD-81; wet surface condition; Table data row 168

□ MD-81; dry surface condition; Table data row 169



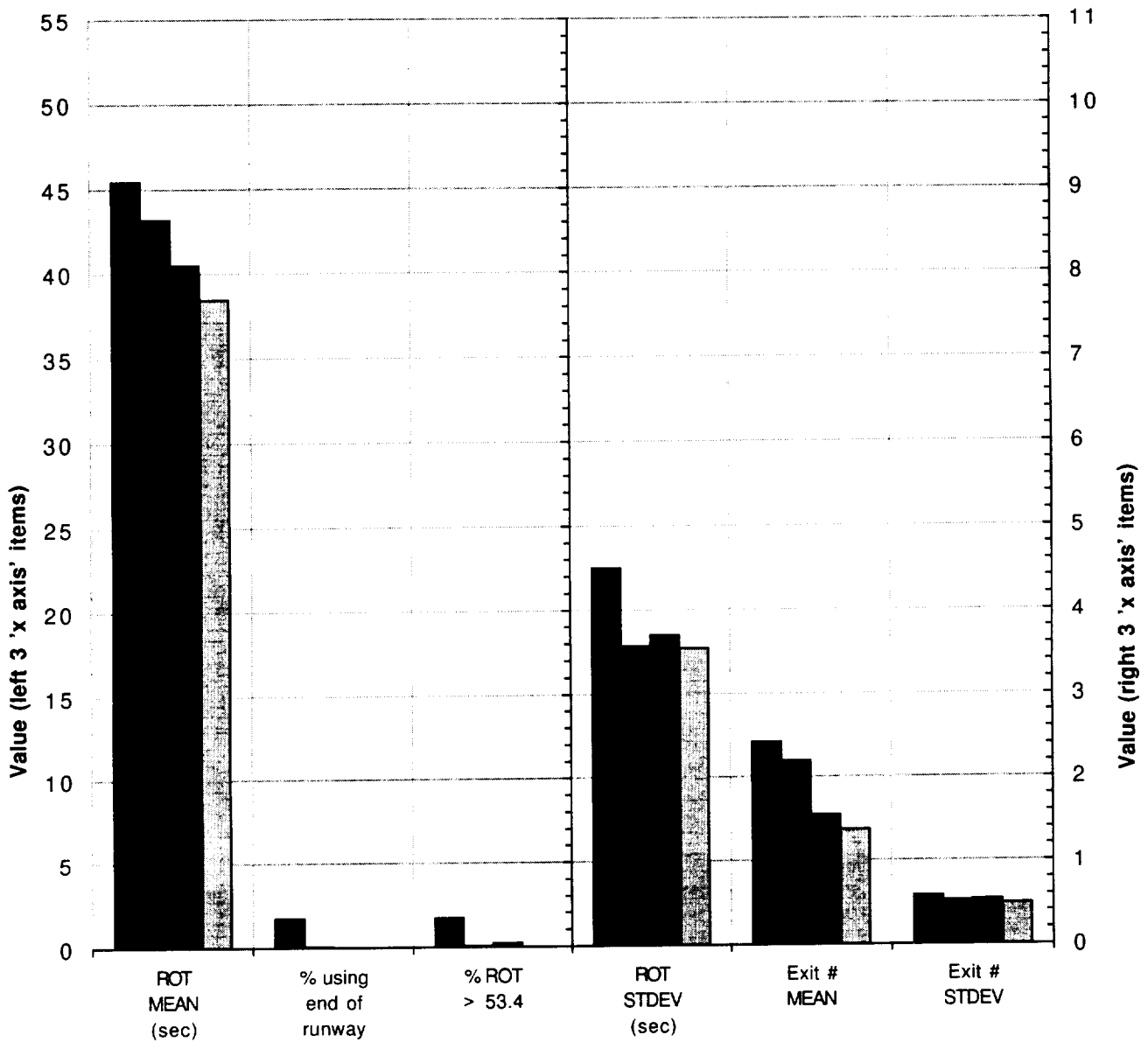
Statistics
Aircraft CG stop on exit at Y=480 feet
mid exit location at 5950 feet
Autoreverse thrust & variable deceleration
with exit prediction

■ MD-11; wet surface condition; Table data row 171

■ MD-11; dry surface condition; Table data row 172

■ MD-81; wet surface condition; Table data row 173

■ MD-81; dry surface condition; Table data row 174



Statistics

**Allow for a maximum deceleration of 9 ft/s/s
mid exit location at 5350 feet**

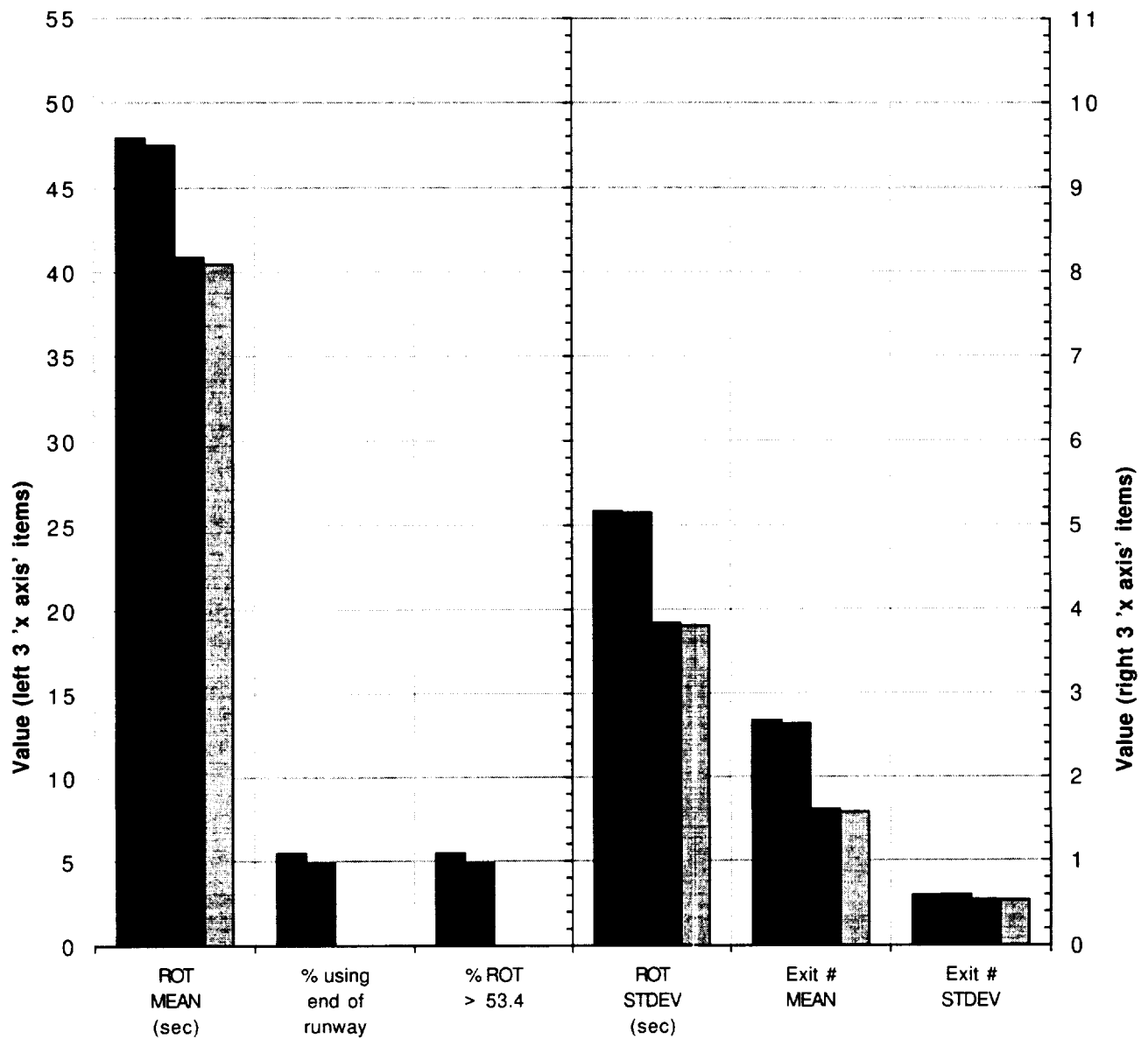
**Autoreverse thrust & variable deceleration
with exit prediction**

■ MD-11; wet surface condition; Table data row 176

■ MD-11; dry surface condition; Table data row 177

■ MD-81; wet surface condition; Table data row 178

■ MD-81; dry surface condition; Table data row 179



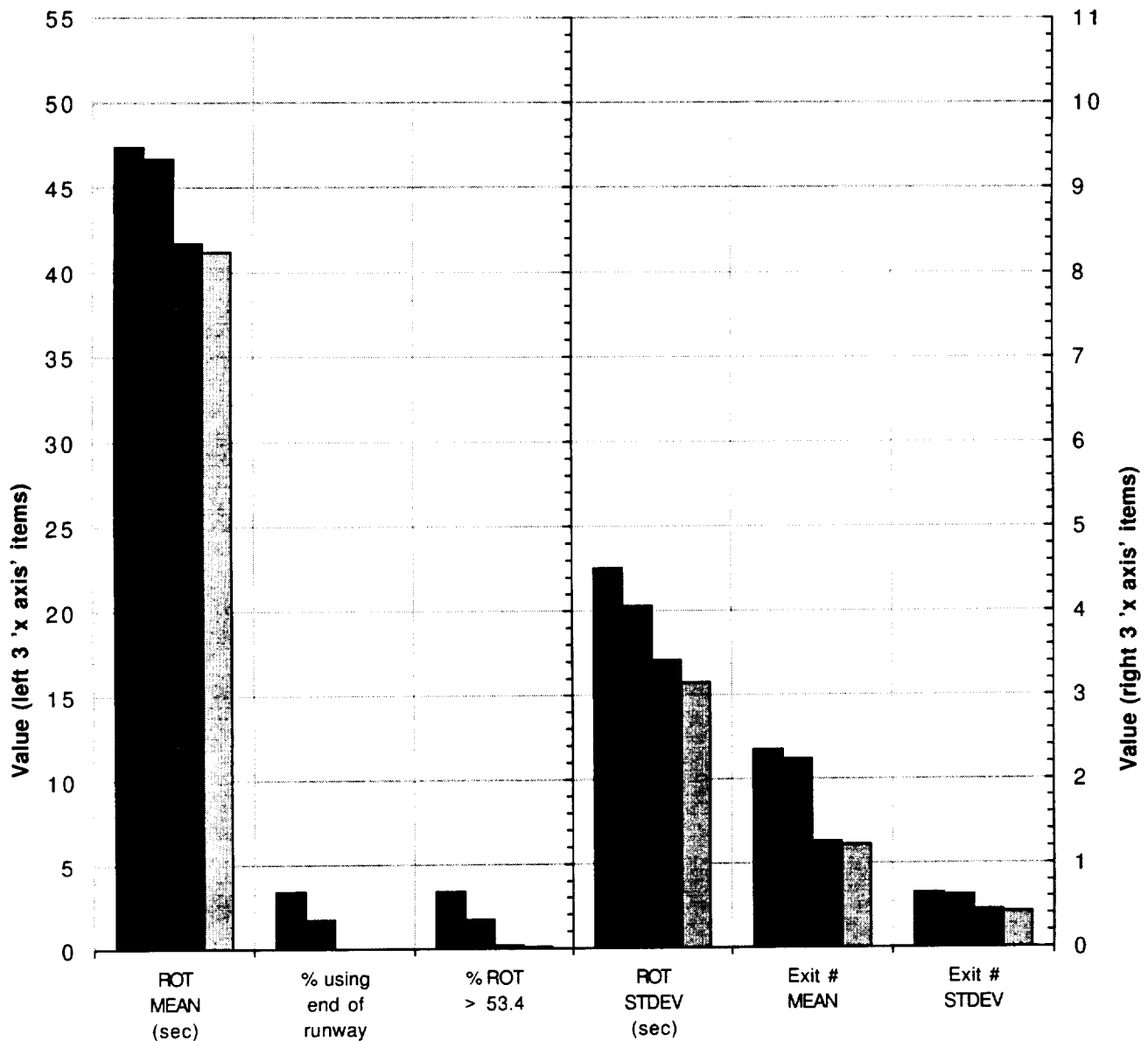
Statistics
Anti-skid efficiency equals 90%
mid exit location at 5350 feet
Autoreverse thrust & variable deceleration
with exit prediction

■ MD-11; wet surface condition; Table data row 181

■ MD-11; dry surface condition; Table data row 182

■ MD-81; wet surface condition; Table data row 183

■ MD-81; dry surface condition; Table data row 184



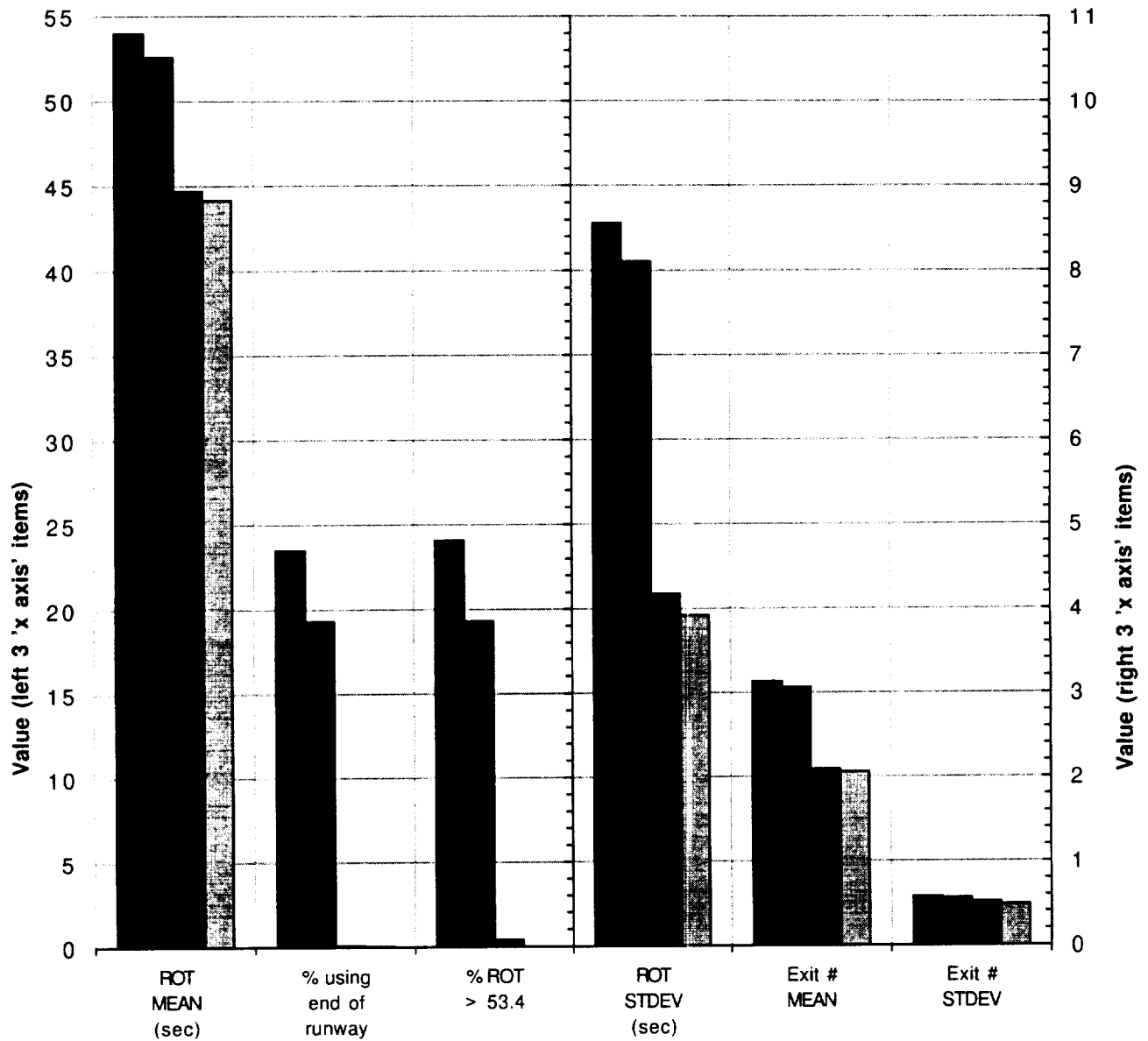
Statistics
Anti-skid efficiency equals 60%
mid exit location at 5950 feet
Autoreverse thrust & variable deceleration
with exit prediction

■ MD-11; wet surface condition; Table data row 186

■ MD-11; dry surface condition; Table data row 187

■ MD-81; wet surface condition; Table data row 188

▨ MD-81; dry surface condition; Table data row 189



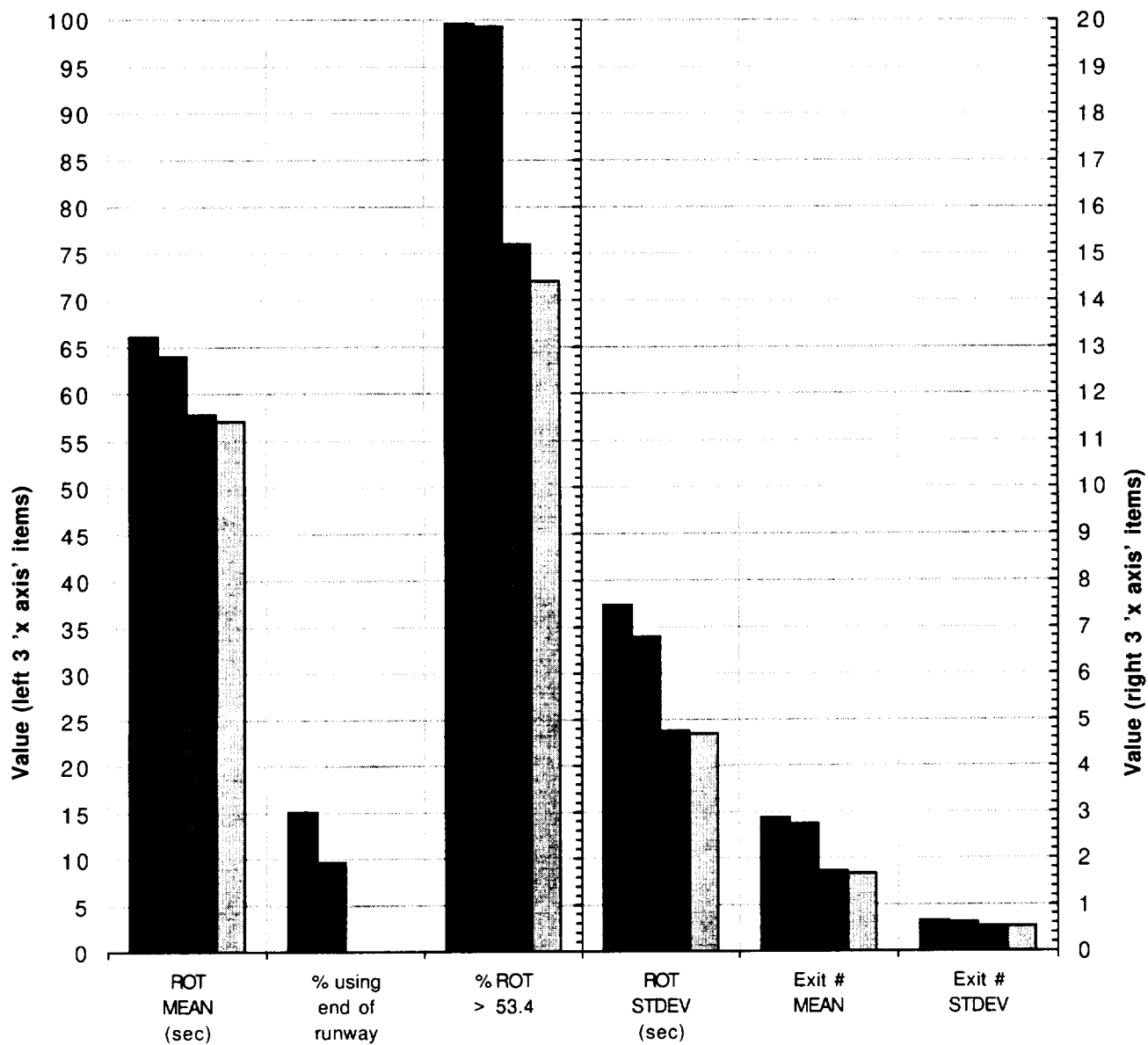
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location at 4950 feet
60 kt exit entrance speed

■ MD-11; wet surface condition; Table data row 191

■ MD-11; dry surface condition; Table data row 192

■ MD-81; wet surface condition; Table data row 193

▨ MD-81; dry surface condition; Table data row 194



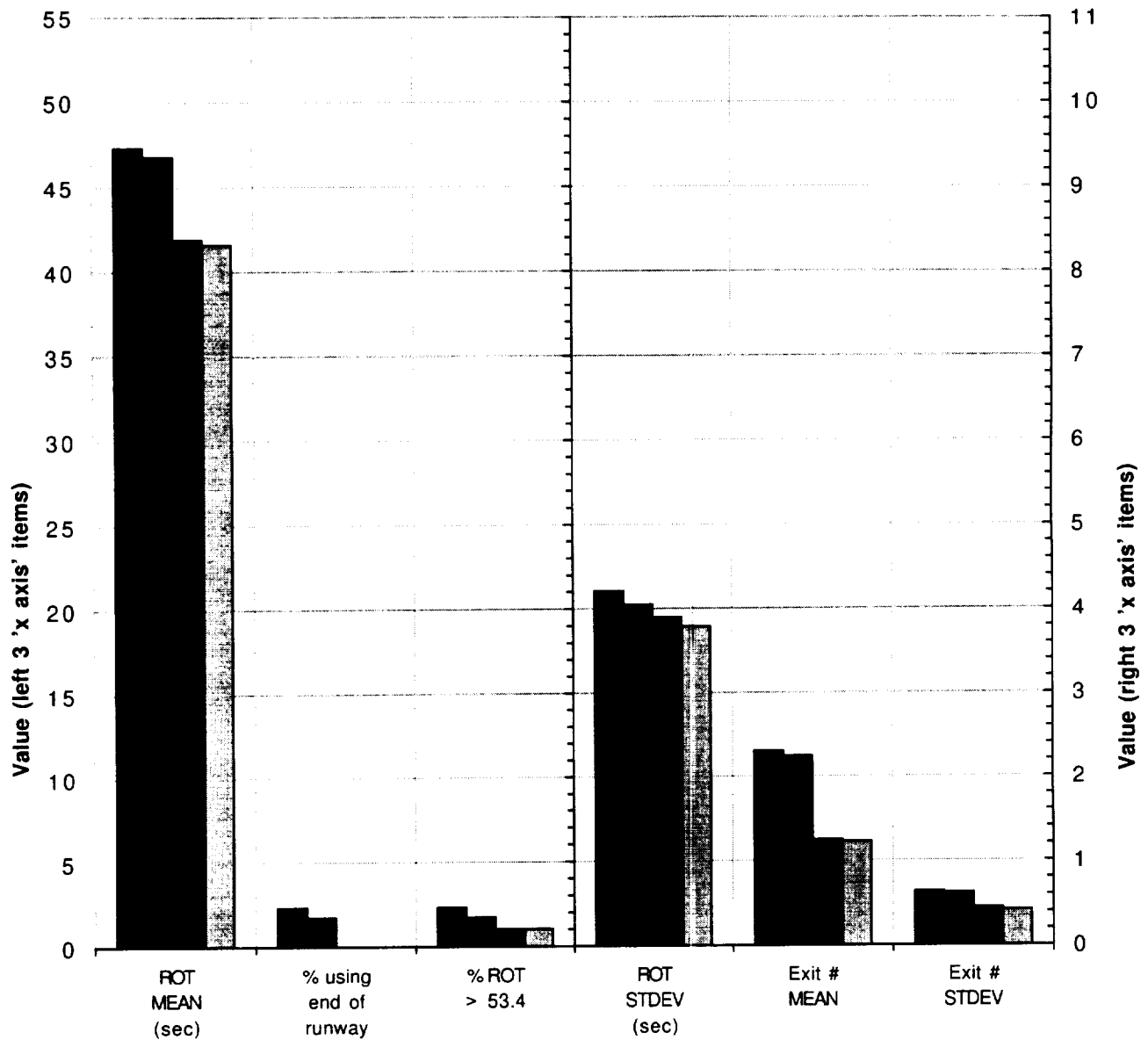
Statistics
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location at 5950 feet
40 kt exit entrance speed

■ MD-11; wet surface condition; Table data row 196

■ MD-11; dry surface condition; Table data row 197

■ MD-81; wet surface condition; Table data row 198

▨ MD-81; dry surface condition; Table data row 199



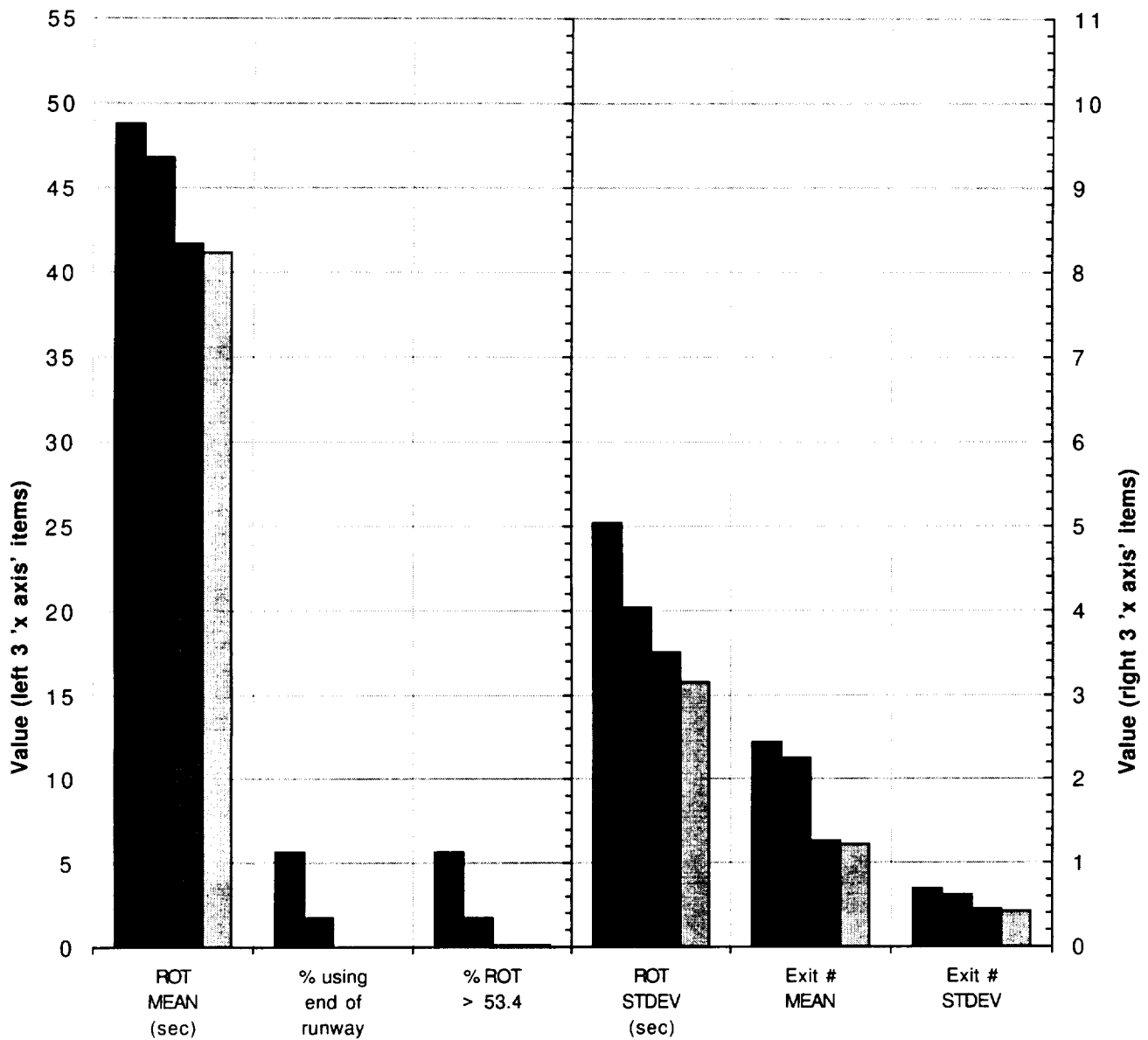
Statistics
Reverse Thrust not stowed on exit
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location at 5950 feet

■ MD-11; wet surface condition; Table data row 201

■ MD-11; dry surface condition; Table data row 202

■ MD-81; wet surface condition; Table data row 203

▨ MD-81; dry surface condition; Table data row 204



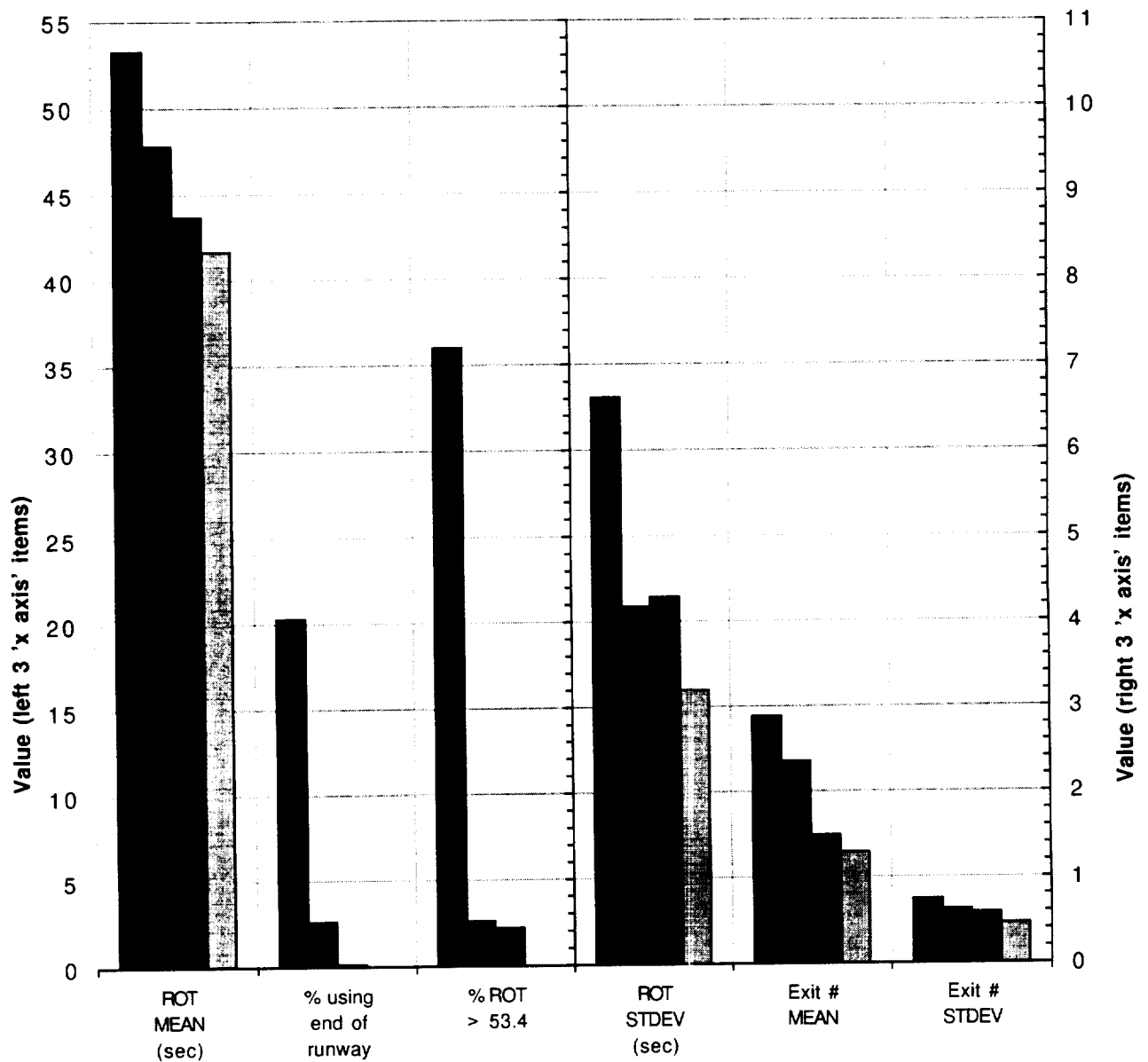
Statistics
Reverse Thrust Idle on Runway
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location at 5950 feet

■ MD-11; wet surface condition; Table data row 206

■ MD-11; dry surface condition; Table data row 207

■ MD-81; wet surface condition; Table data row 208

■ MD-81; dry surface condition; Table data row 209



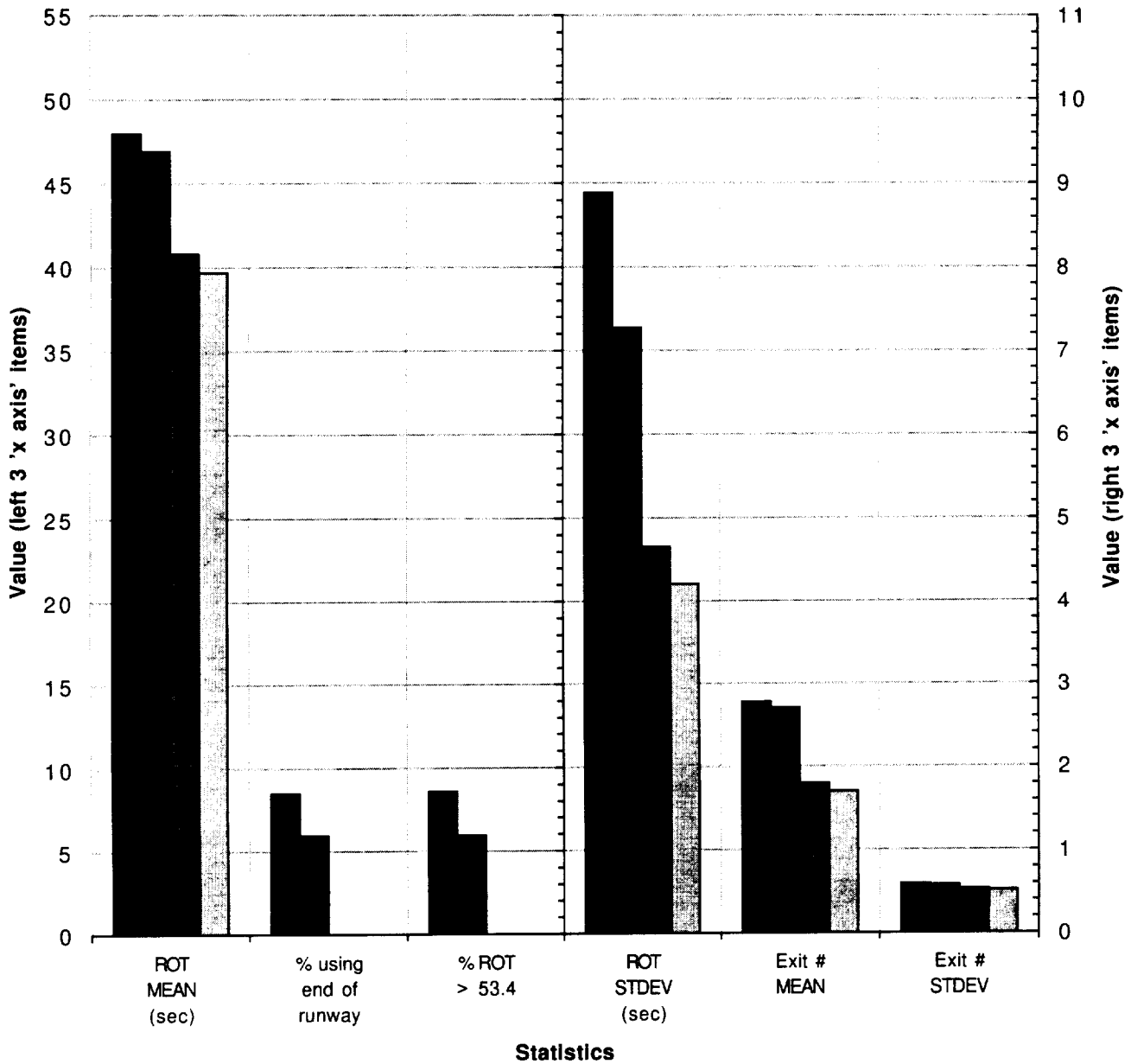
**Statistics
NO Reverse Thrust
Autoreverse thrust & variable deceleration
with exit prediction
mid exit location at 5950 feet**

■ MD-11; wet surface condition; Table data row 211

■ MD-11; dry surface condition; Table data row 212

■ MD-81; wet surface condition; Table data row 213

□ MD-81; dry surface condition; Table data row 214



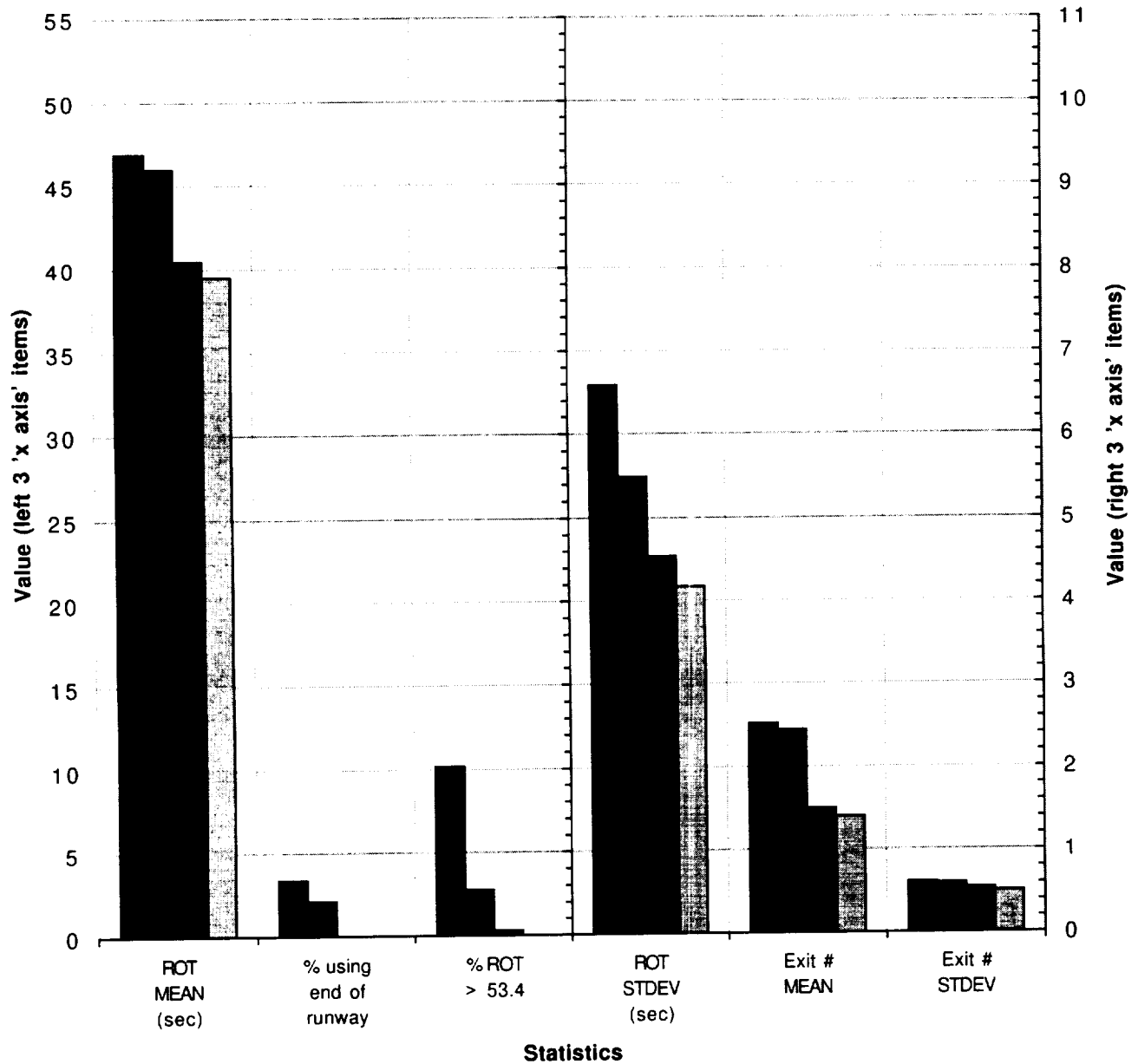
Immediate max const reverse thrust & immed. const 6.5 decel
NO exit prediction
mid exit location = 4950

■ MD-11; wet surface condition; Table data row 216

■ MD-11; dry surface condition; Table data row 217

■ MD-81; wet surface condition; Table data row 218

▨ MD-81; dry surface condition; Table data row 219



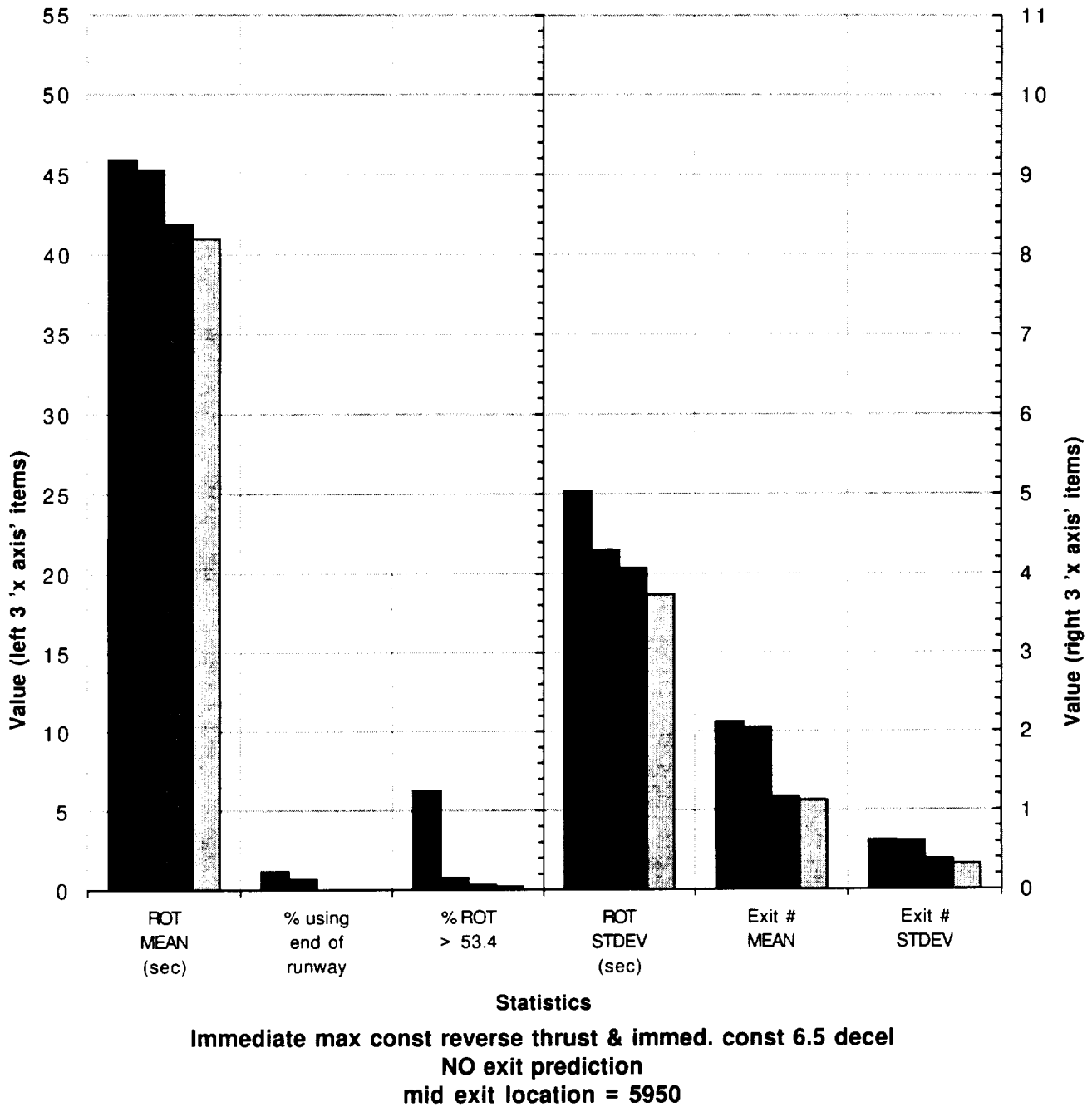
Immediate max const reverse thrust & immed. const 6.5 decel
NO exit prediction
mid exit location = 5350

■ MD-11; wet surface condition; Table data row 221

■ MD-11; dry surface condition; Table data row 222

■ MD-81; wet surface condition; Table data row 223

▨ MD-81; dry surface condition; Table data row 224

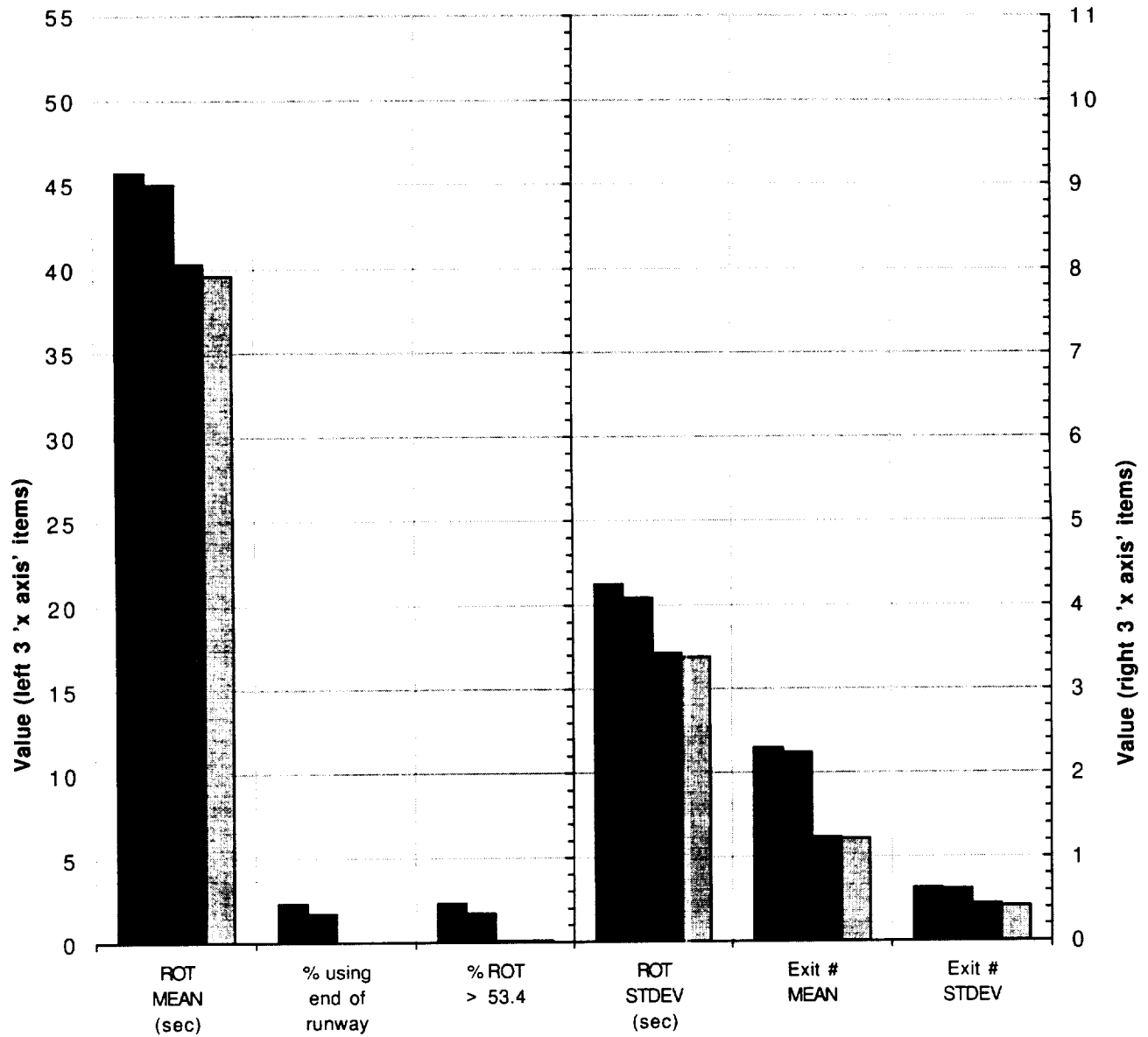


■ MD-11; wet surface condition; Table data row 226

■ MD-11; dry surface condition; Table data row 227

■ MD-81; wet surface condition; Table data row 228

▨ MD-81; dry surface condition; Table data row 229



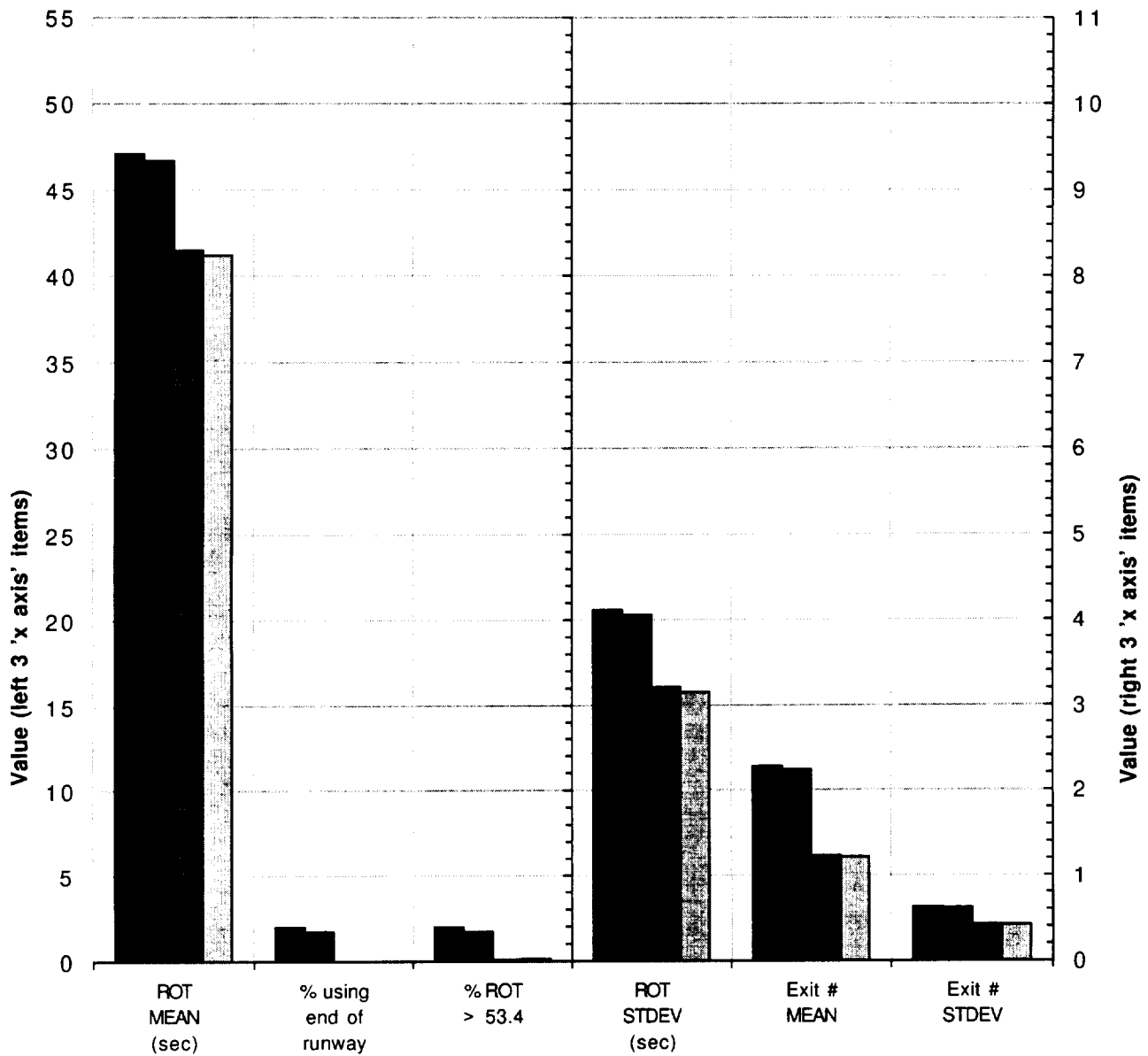
Statistics
Auto asymmetric braking on exit
Auto reverse thrust/variable braking
with exit prediction
mid exit location = 5950

■ MD-11; wet surface condition; Table data row 231

■ MD-11; dry surface condition; Table data row 232

■ MD-81; wet surface condition; Table data row 233

■ MD-81; dry surface condition; Table data row 234



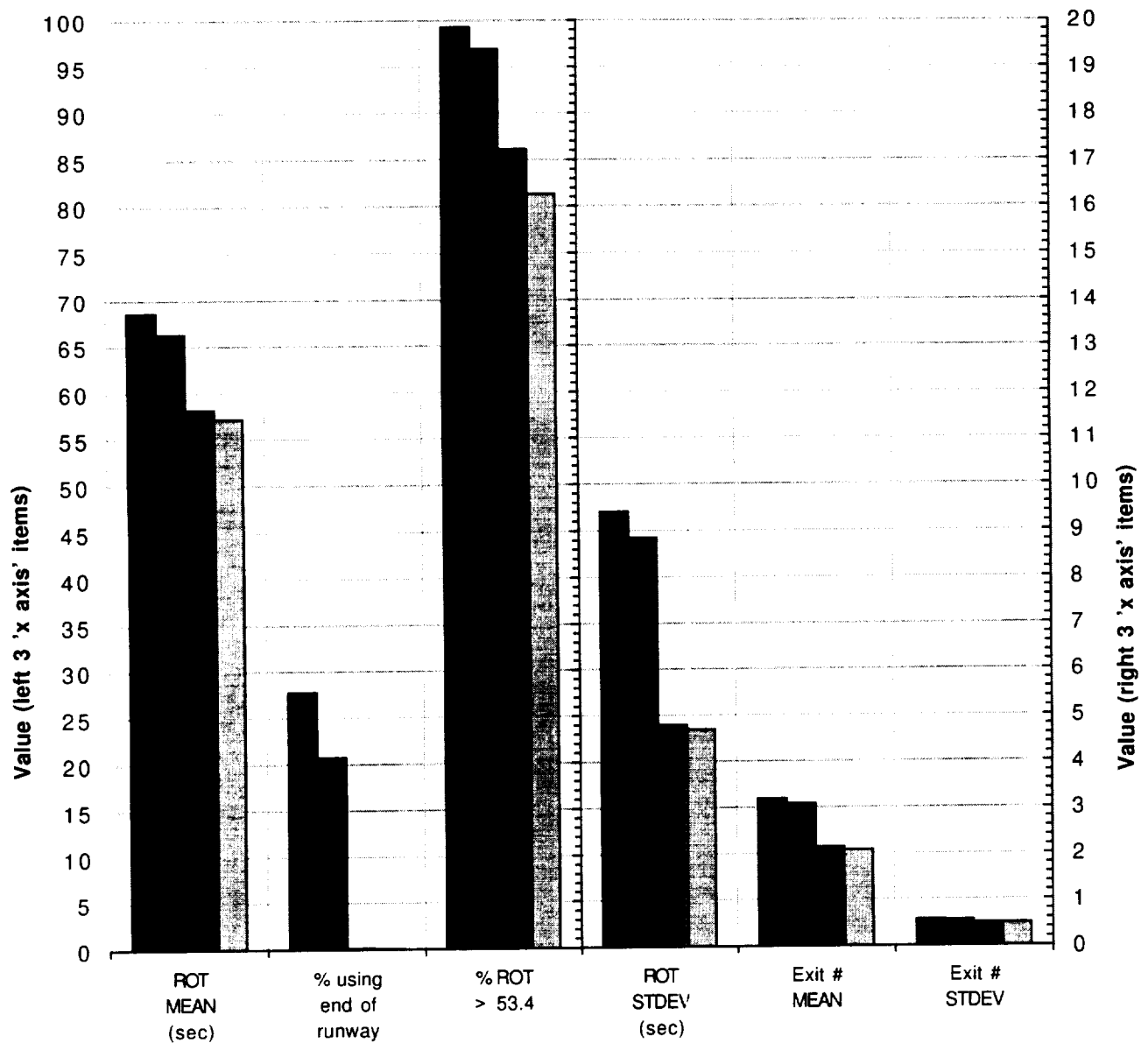
Statistics
Anti-skid efficiency equals 90%
Mid exit location at 5950 feet
Autoreverse thrust & variable deceleration
with exit prediction

■ MD-11; wet surface condition; Table data row 236

■ MD-11; dry surface condition; Table data row 237

■ MD-81; wet surface condition; Table data row 238

■ MD-81; dry surface condition; Table data row 239



Statistics
Autoreverse thrust & variable deceleration
with exit prediction
Mid exit location at 5350 feet
40 kt exit entrance speed

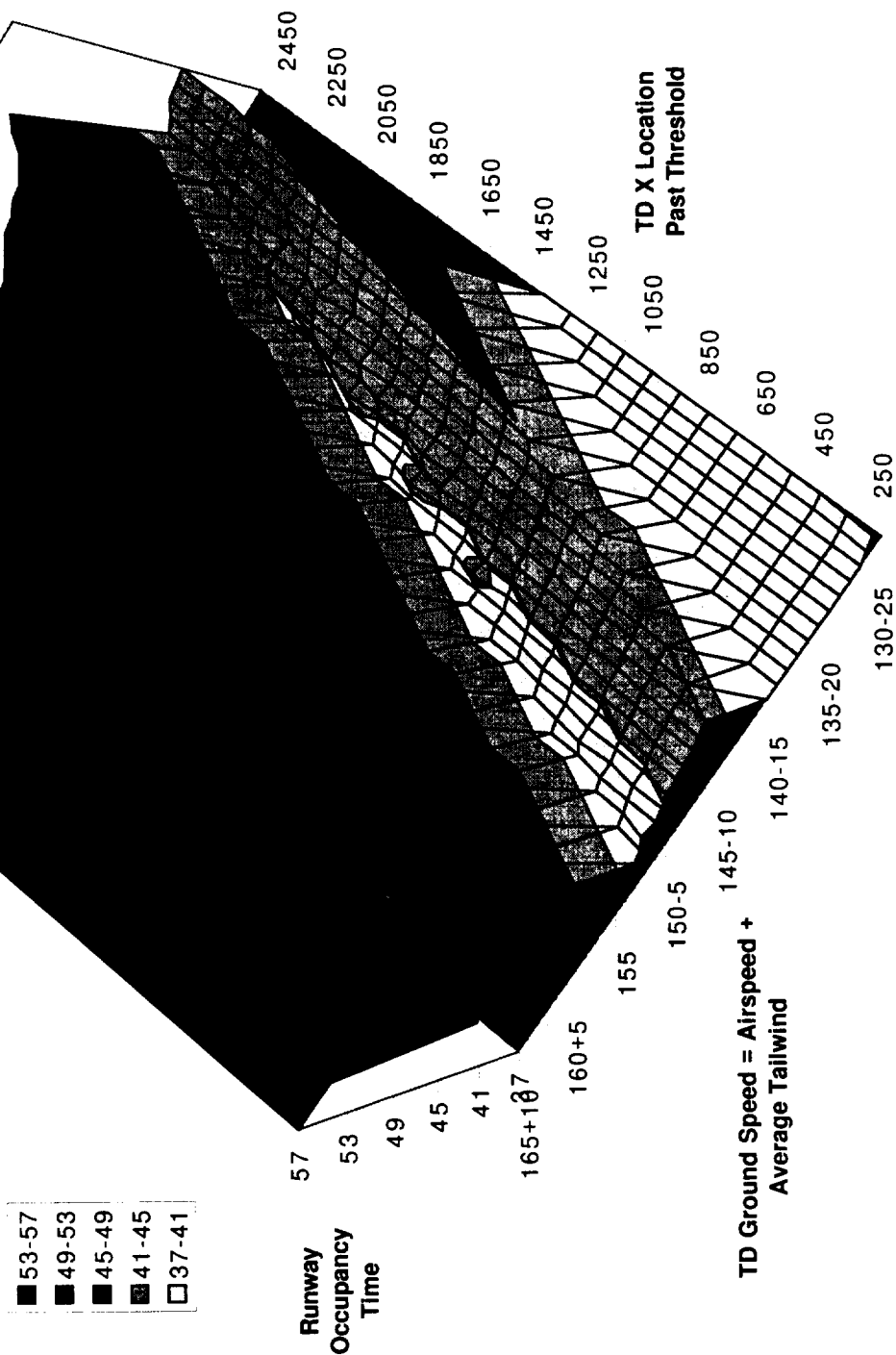
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

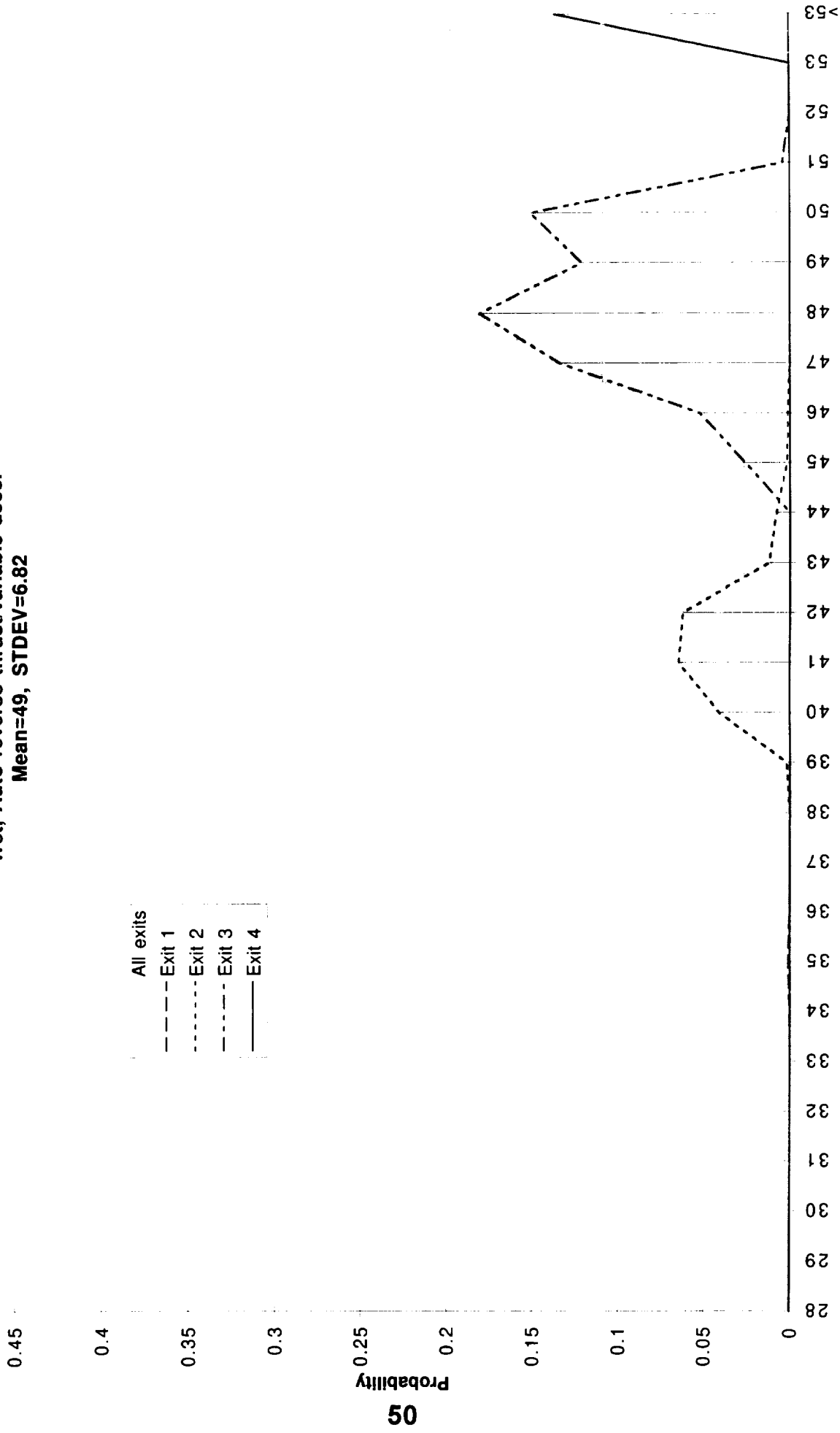
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=49, STDEV=6.82



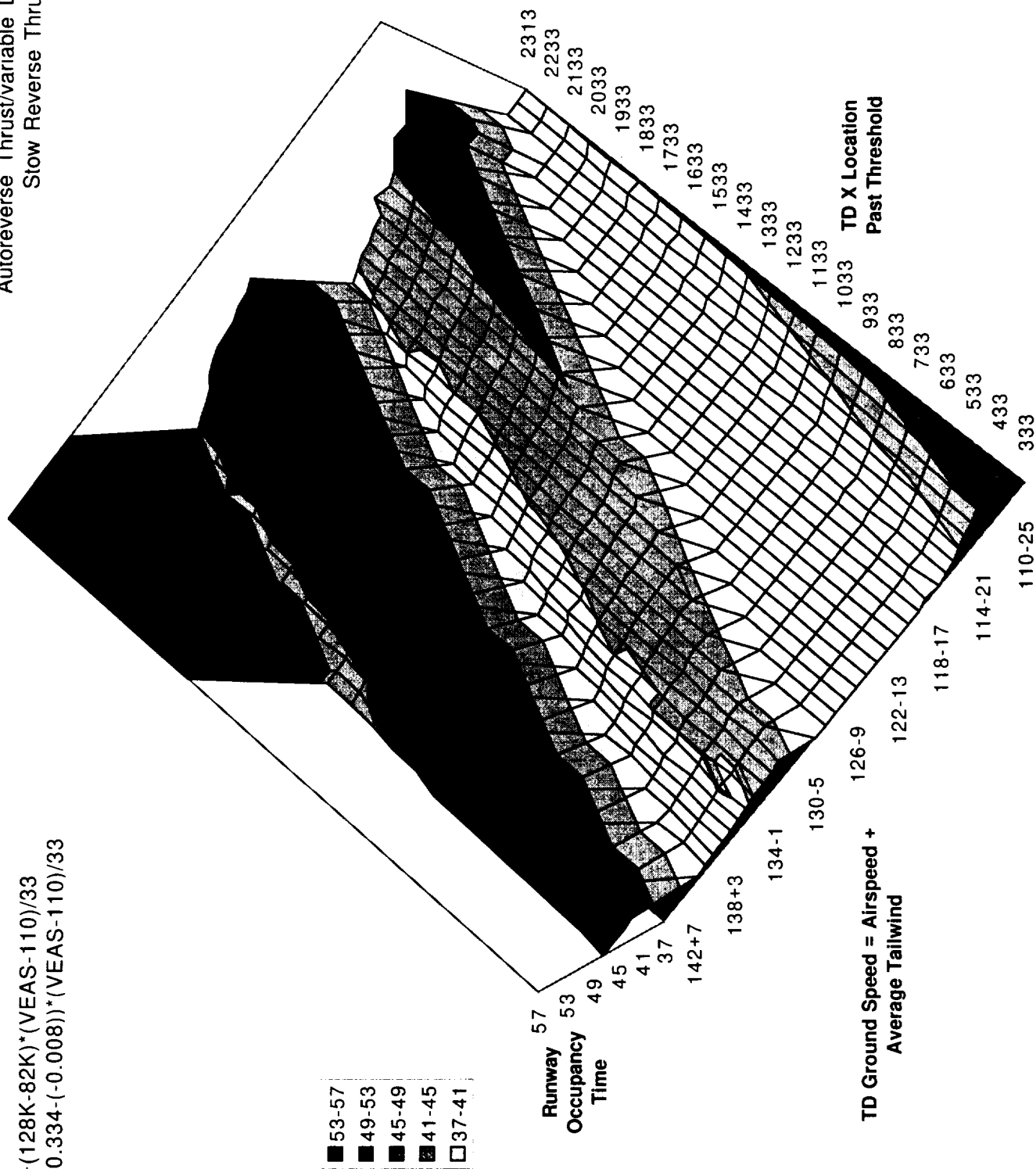
MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3500, 4950, 6550 & 10000 feet

Predict exit prior to TD

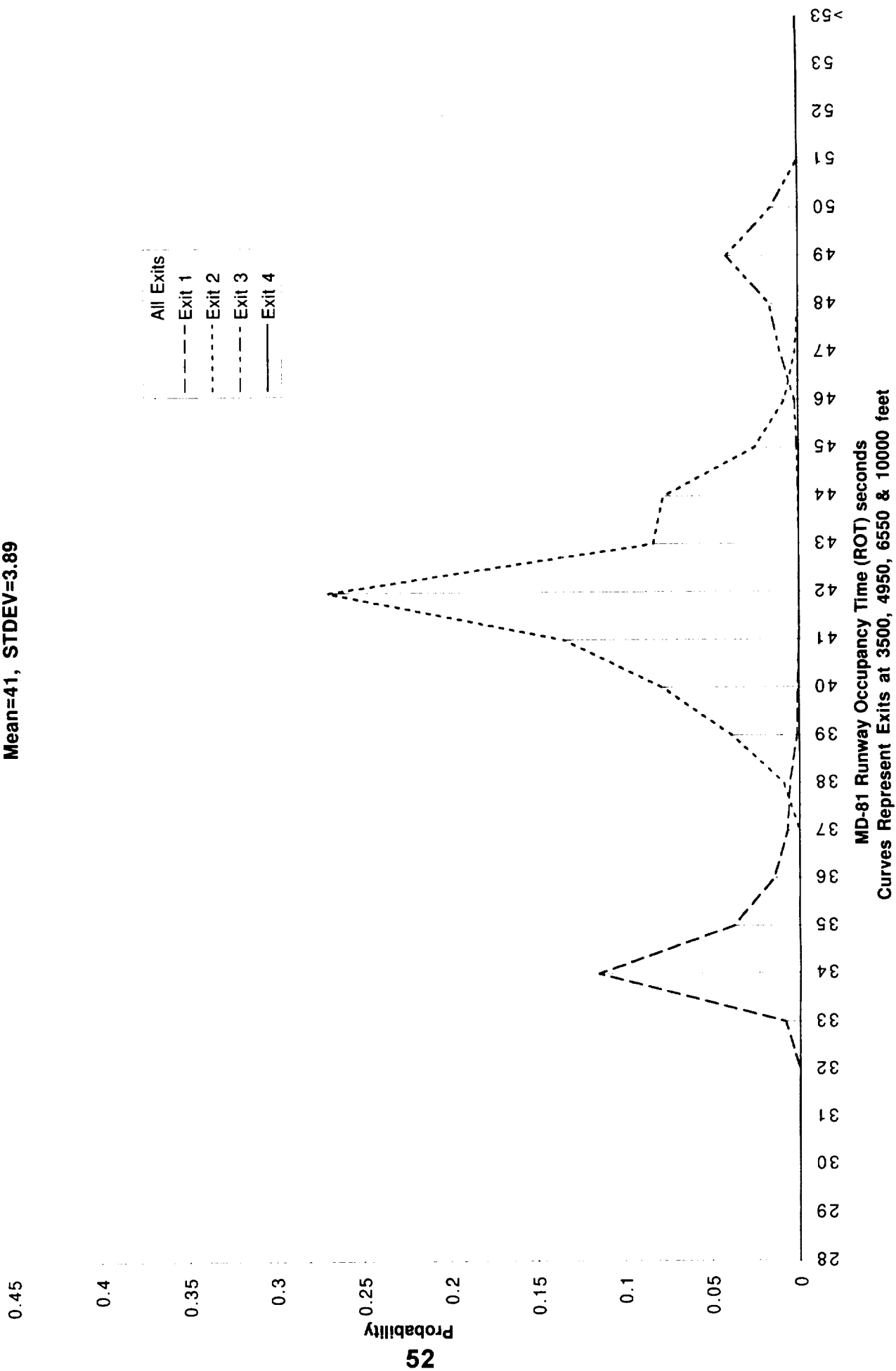
$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=41, STDEV=3.89



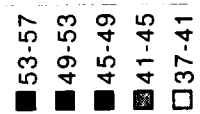
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

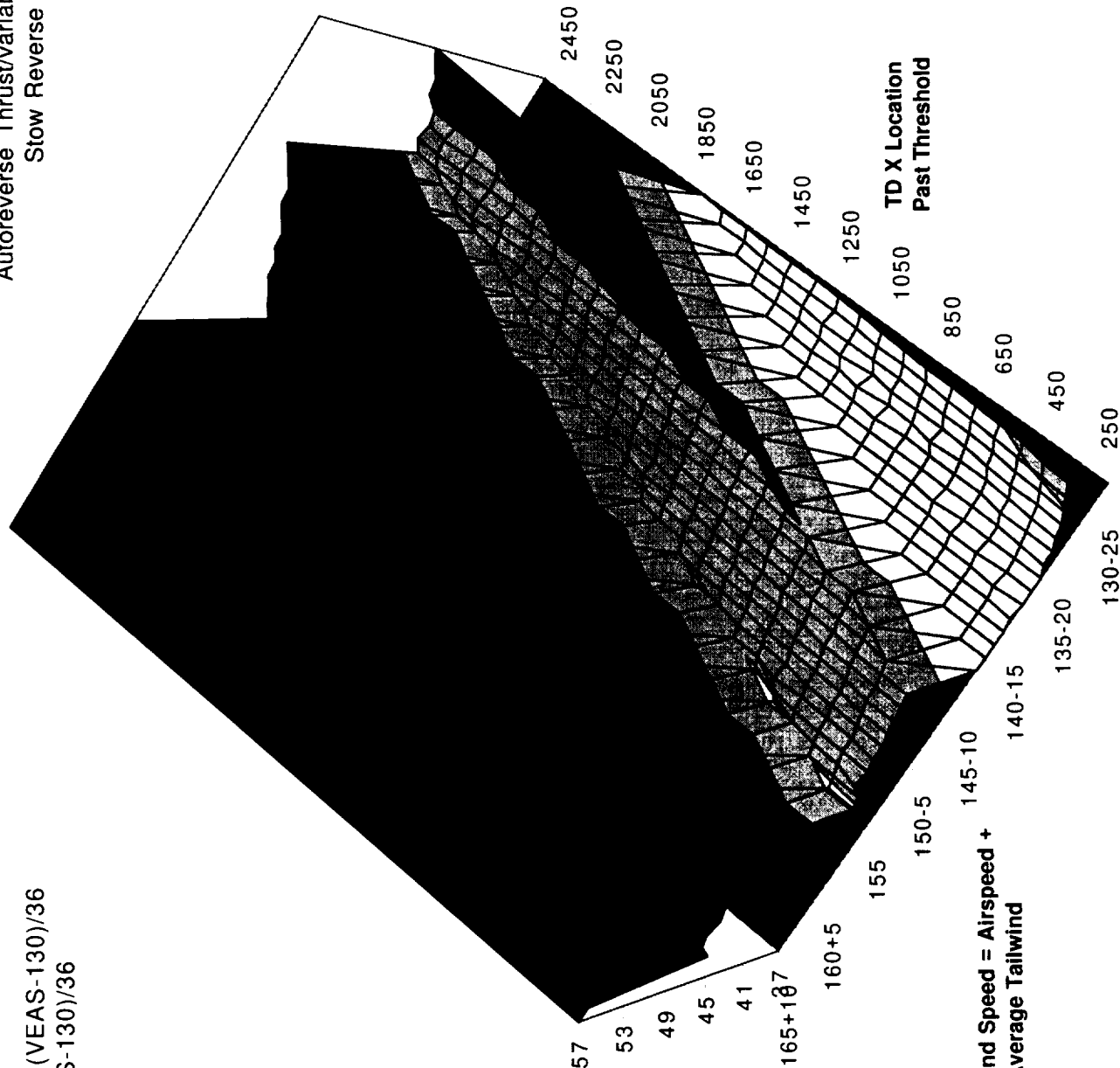
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

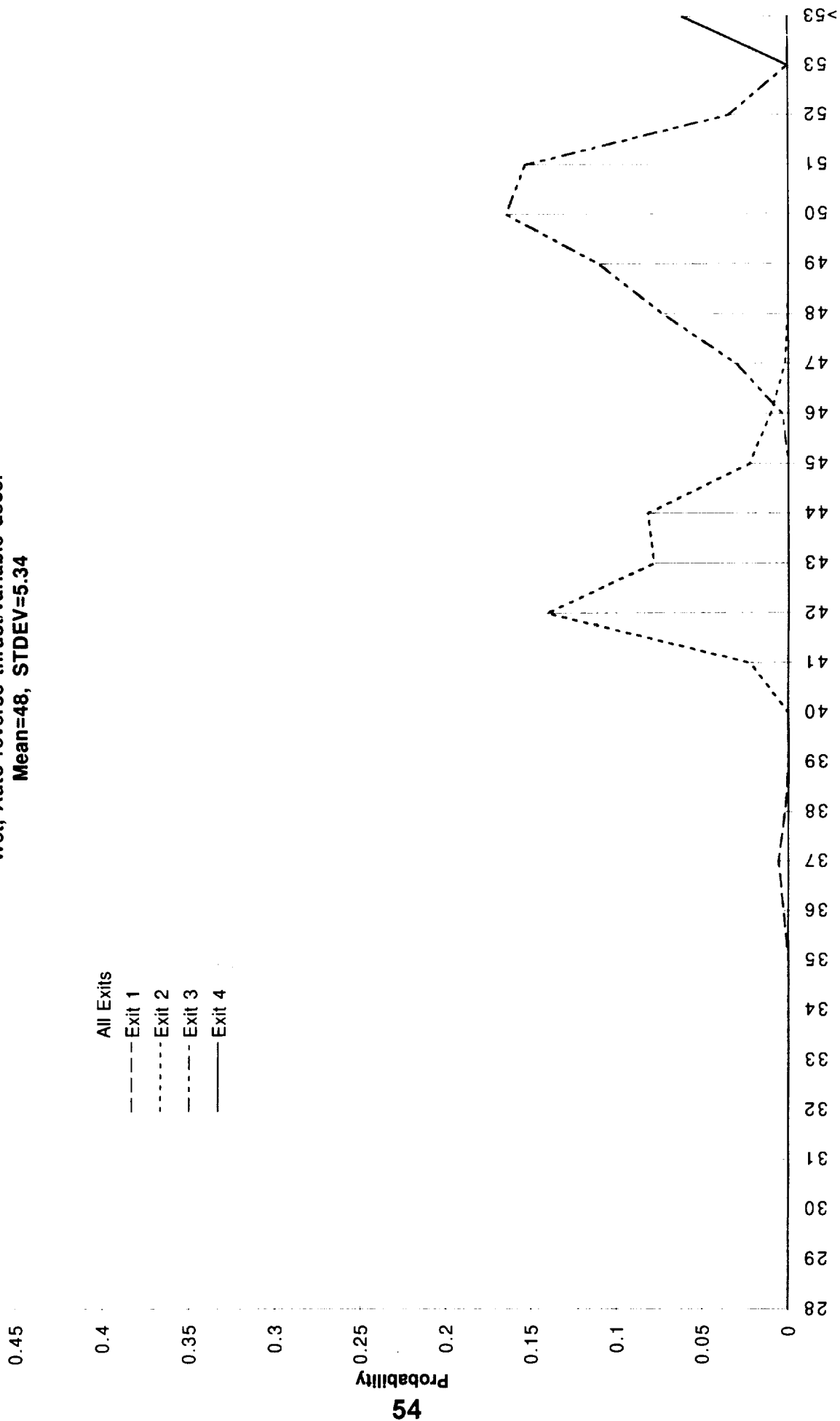


Runway
Occupancy
Time



TD Ground Speed = Airspeed +
Average Tailwind

MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=48, STDEV=5.34



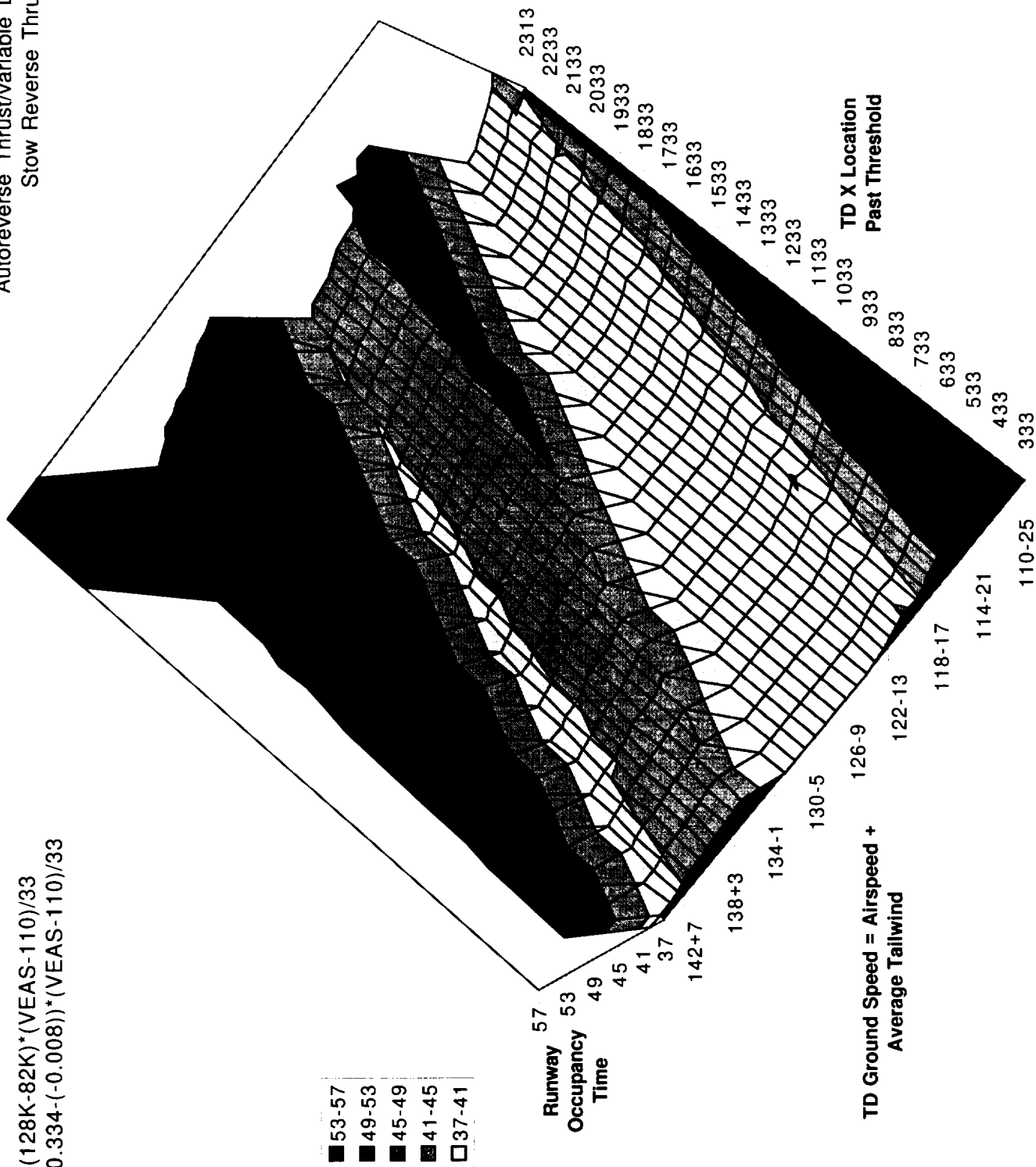
MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3900, 5350, 6950 & 10000 feet

Predict exit prior to TD

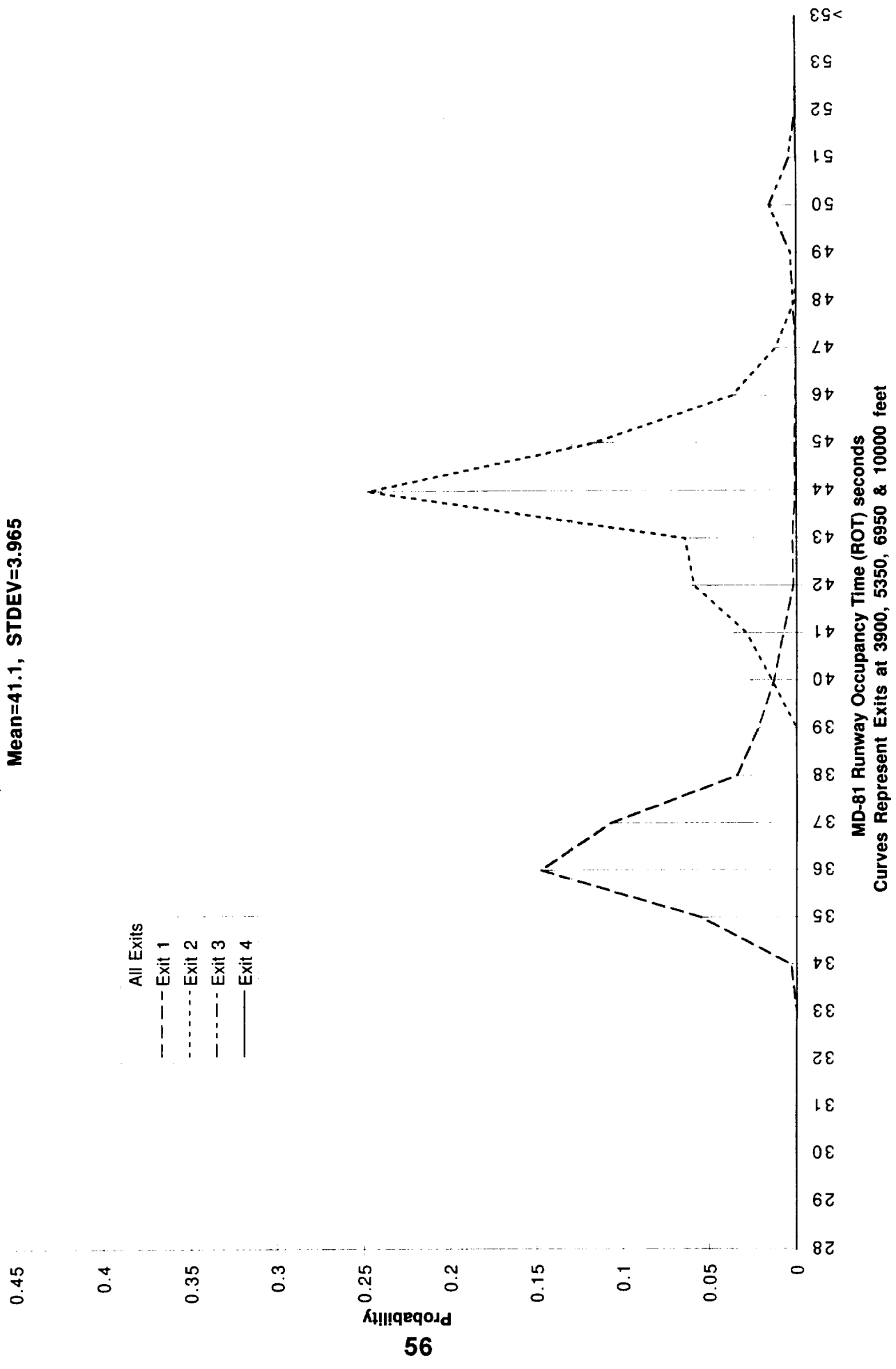
$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=41.1, STDEV=3.965



Predict exit prior to TD

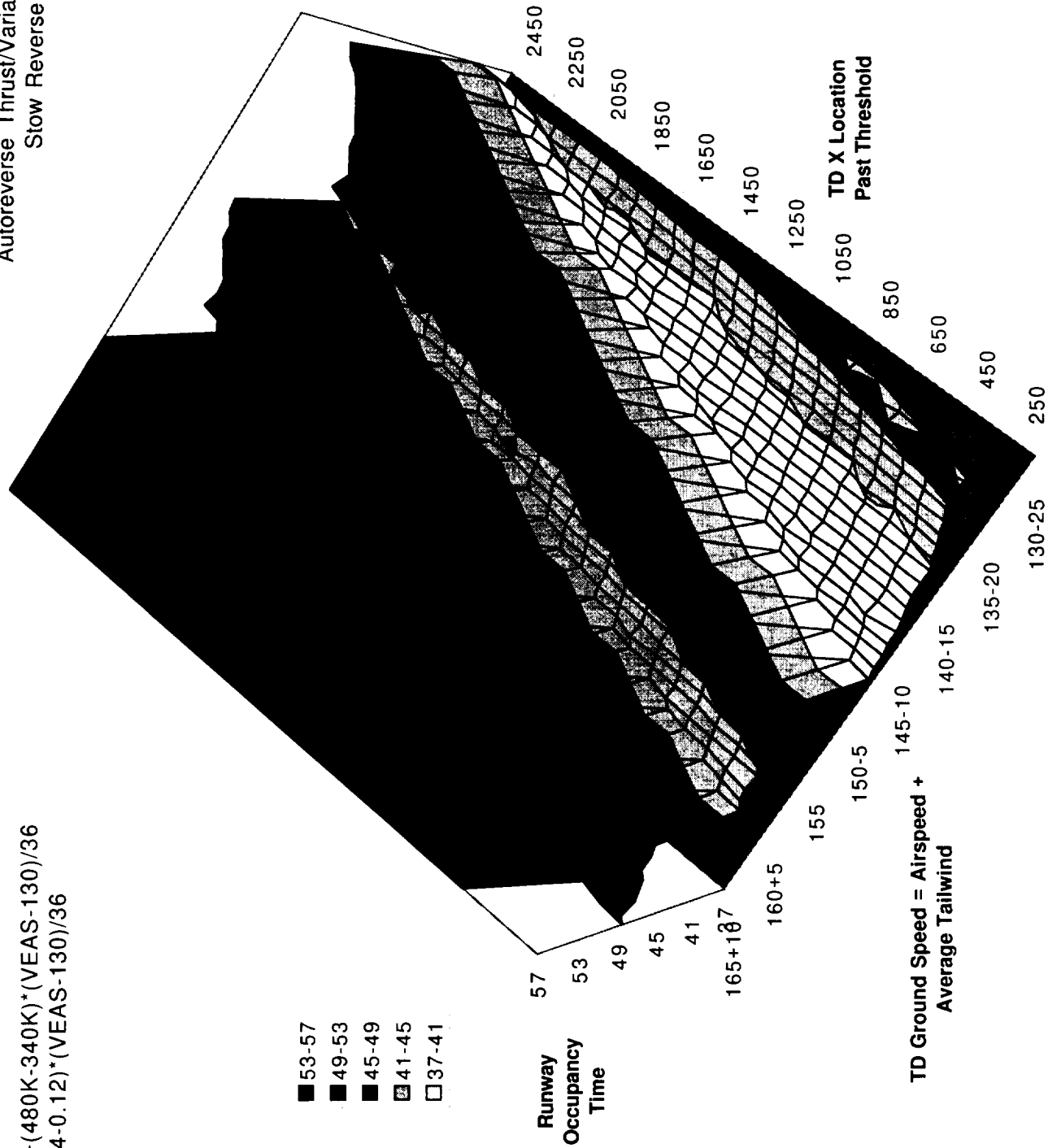
$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

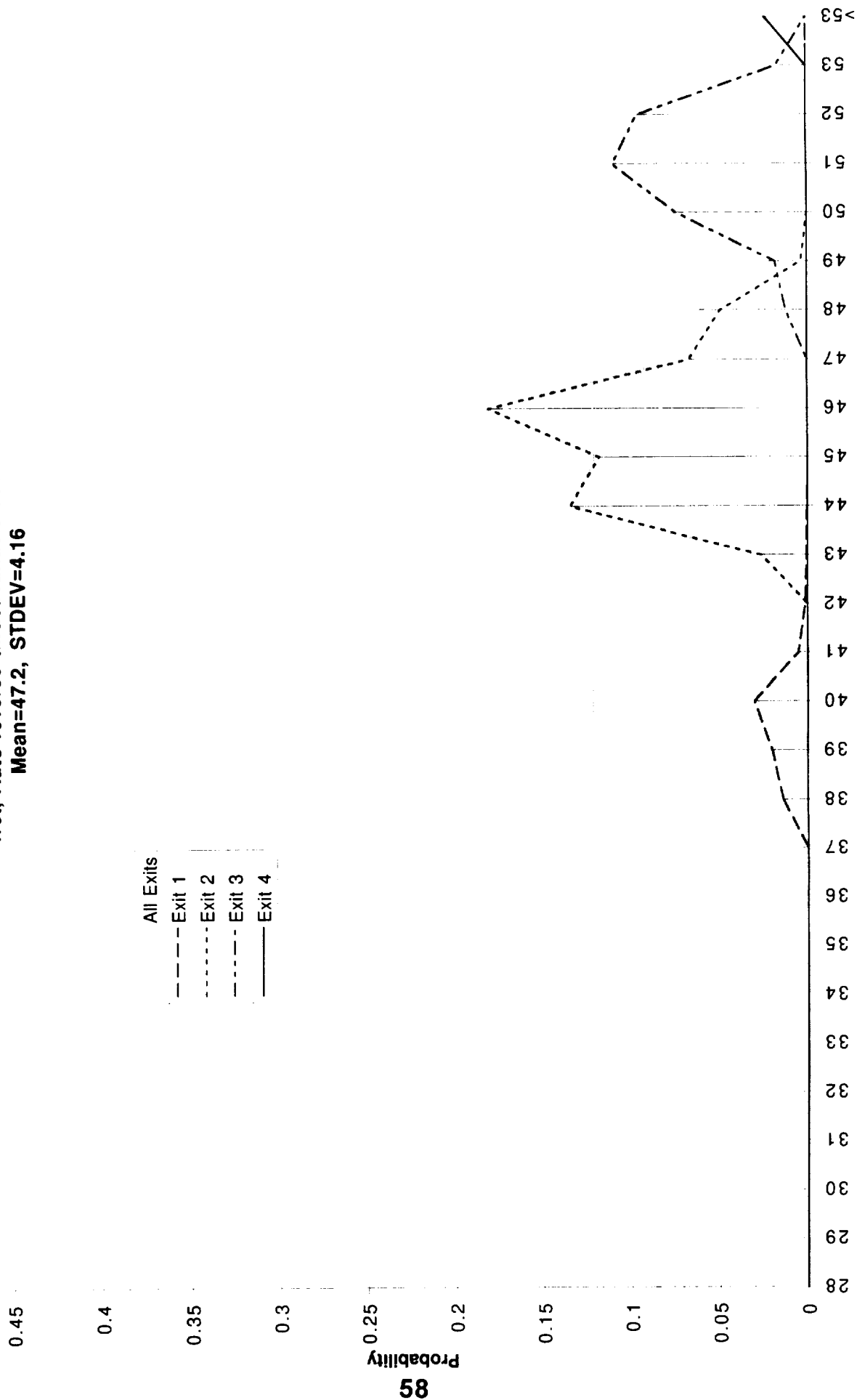
MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=47.2, STDEV=4.16



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

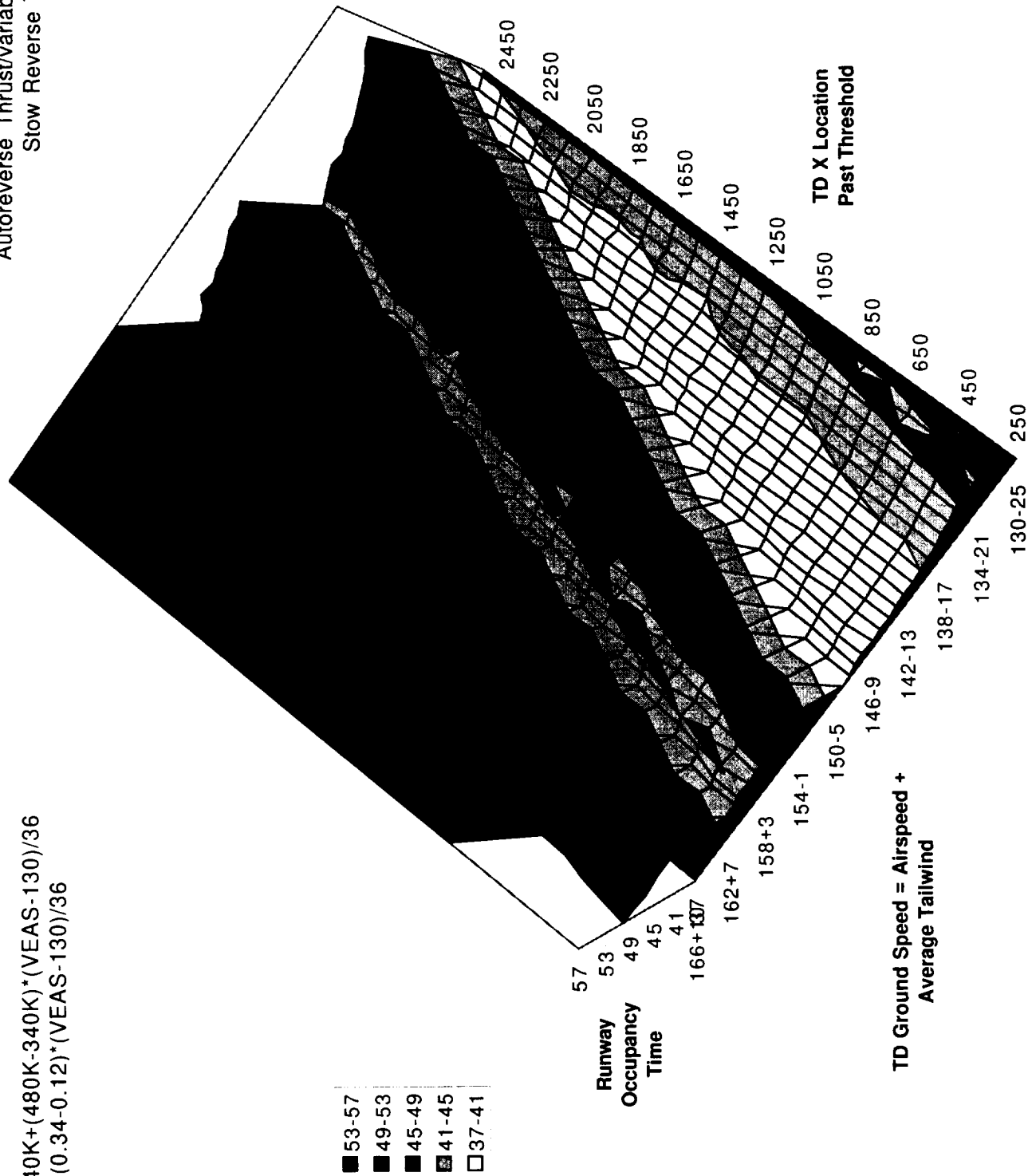
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

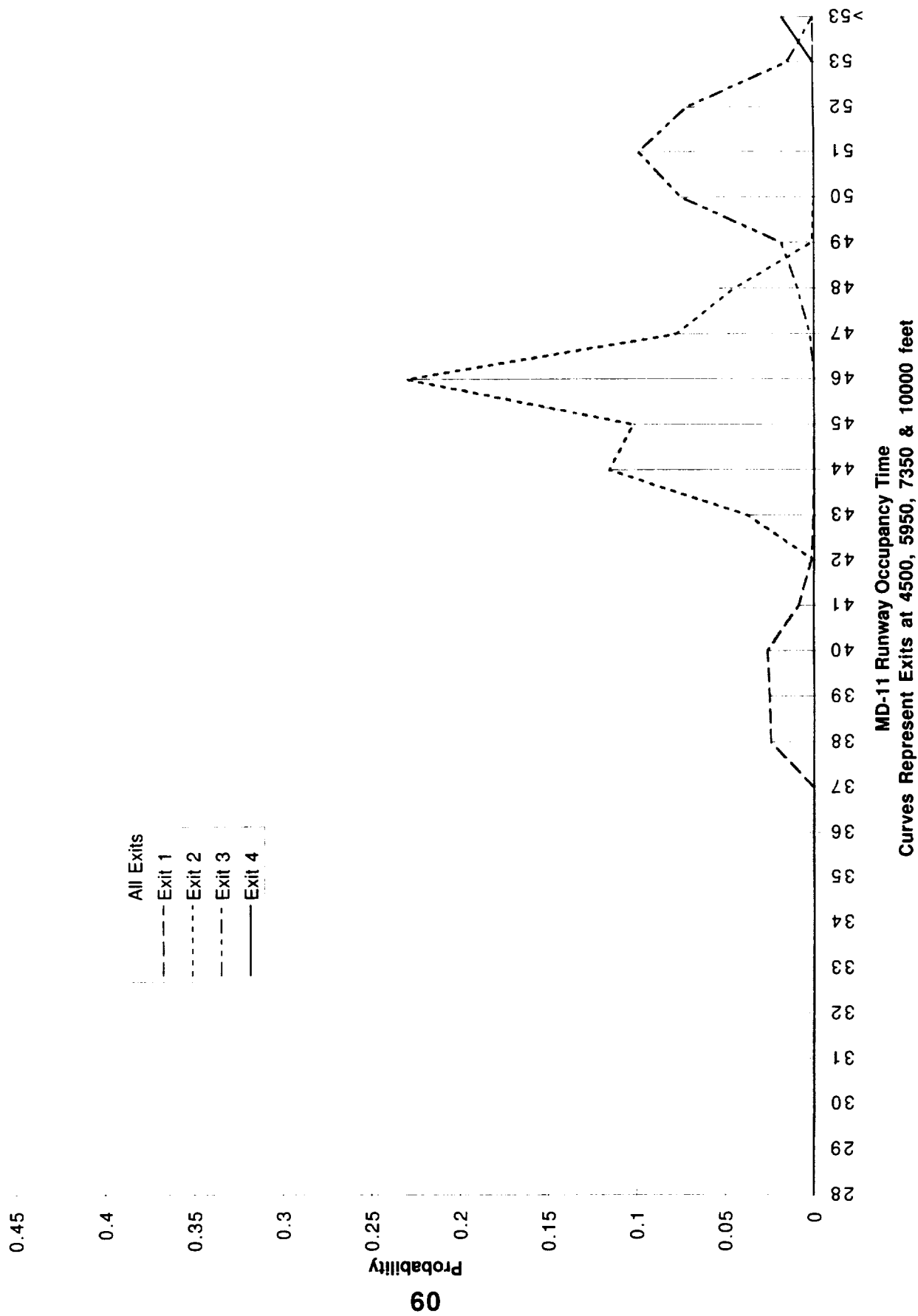
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel
 Mean=46.8, STDEV=4.017



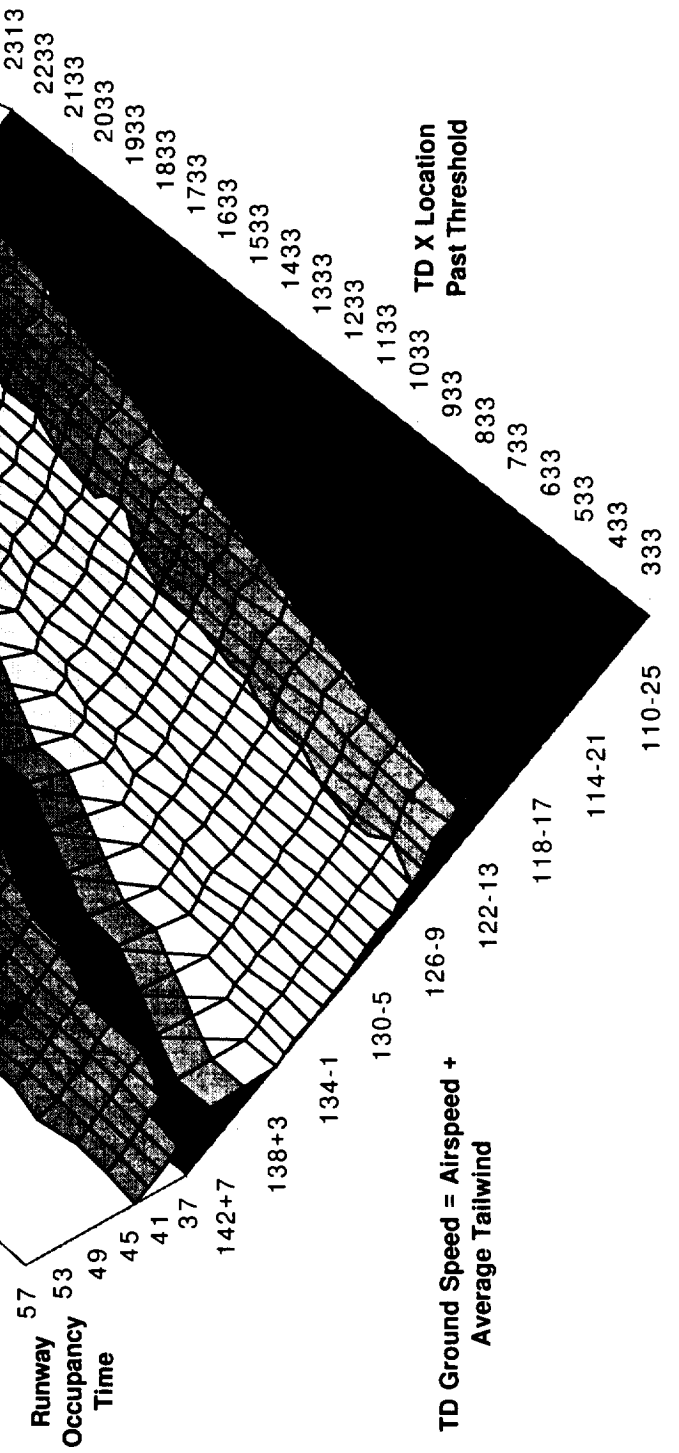
Predict exit prior to TD

MD-81 ROTO Occupancy Time

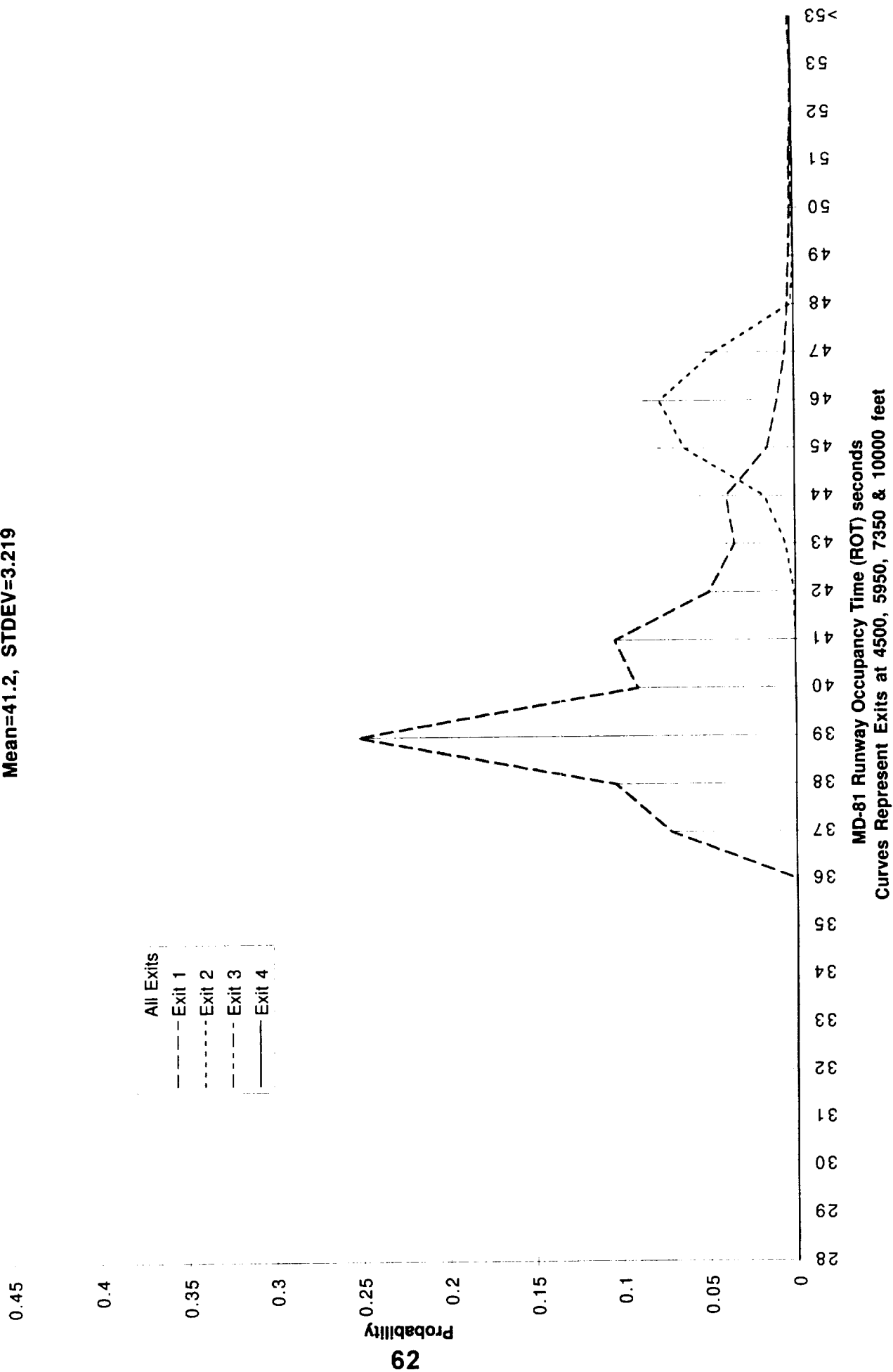
Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=41.2, STDEV=3.219



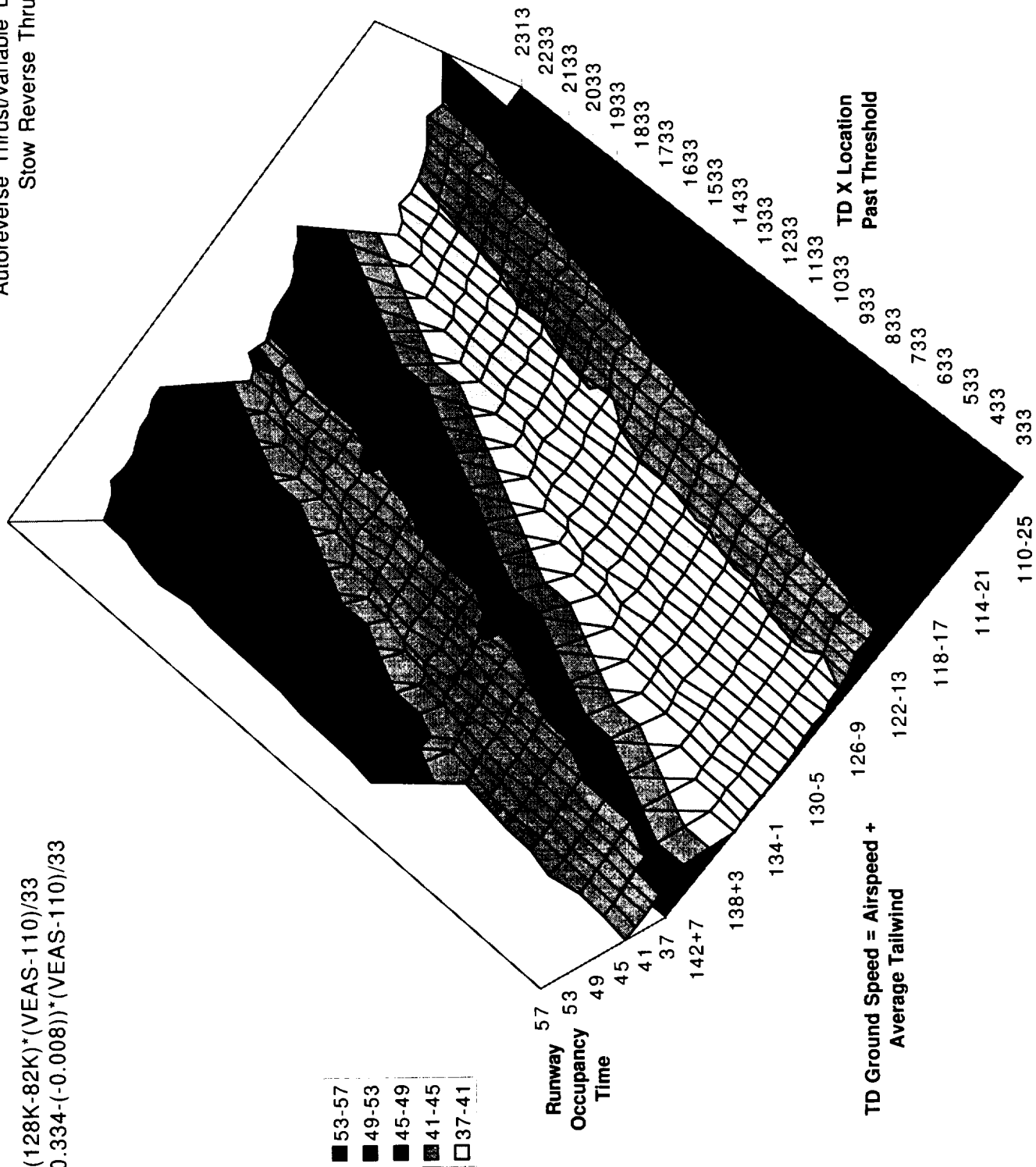
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

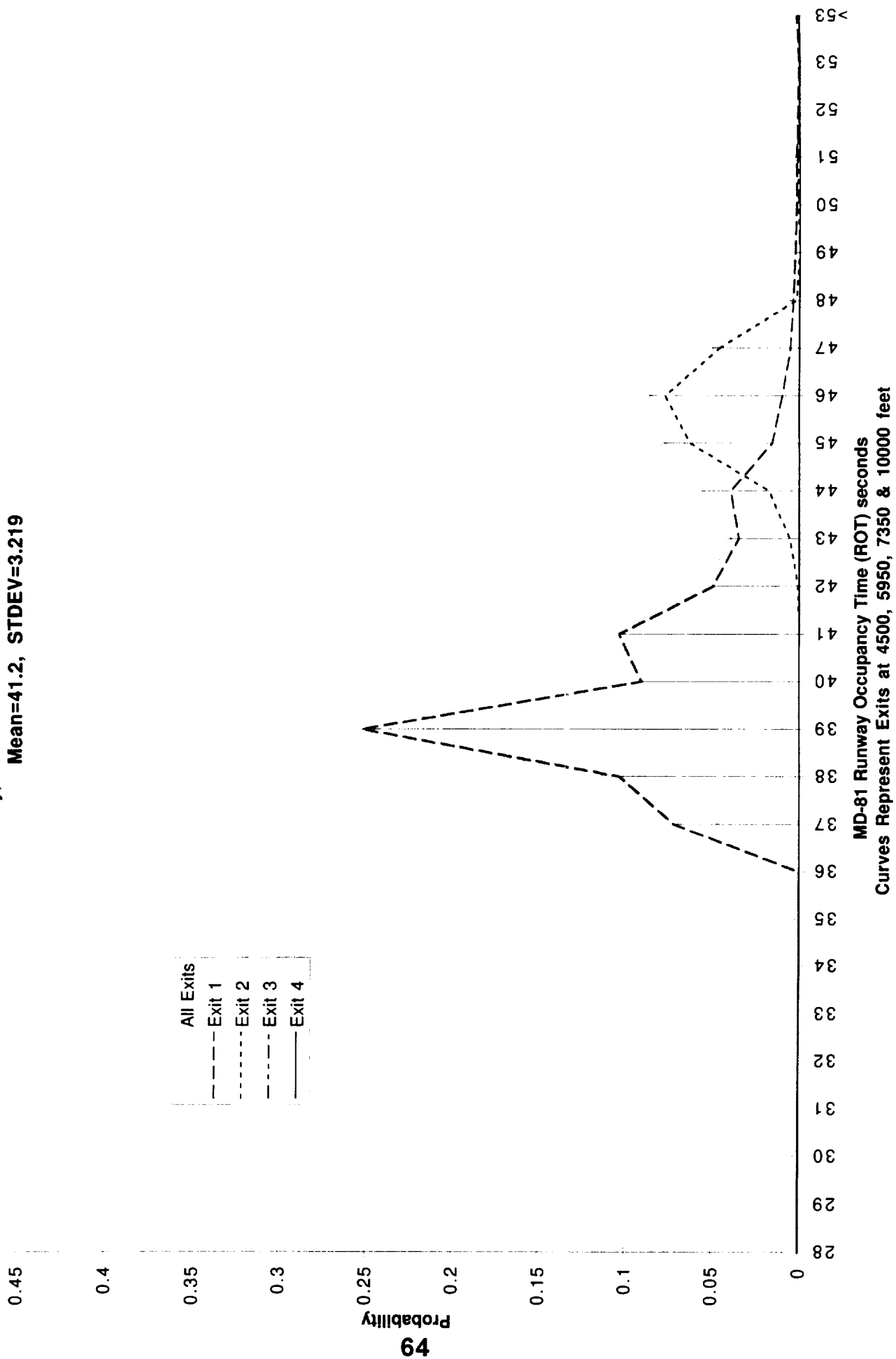
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel
 Mean=41.2, STDEV=3.219

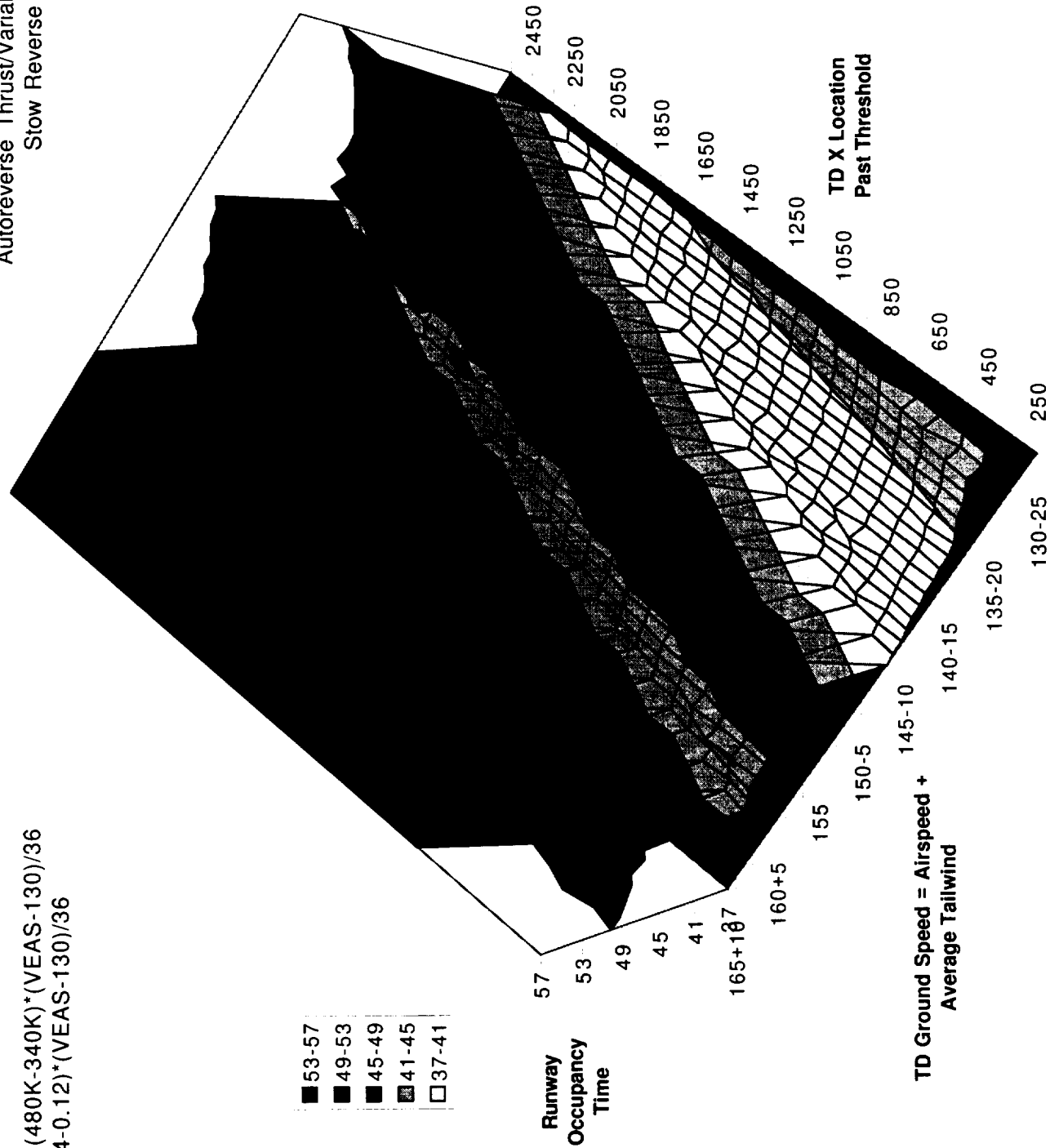


Predict exit prior to TD

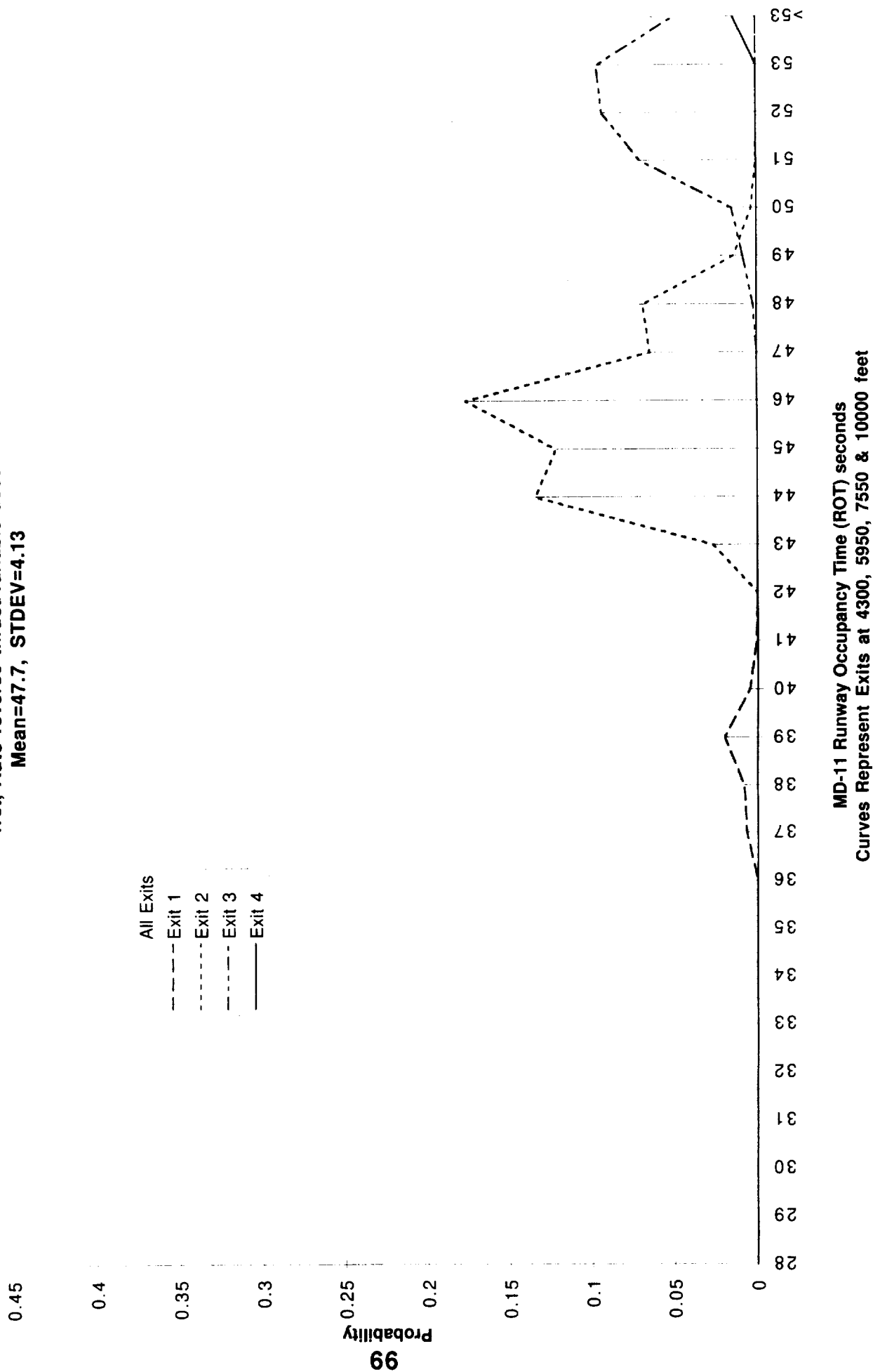
$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$
$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4300, 5950, 7550, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=47.7, STDEV=4.13



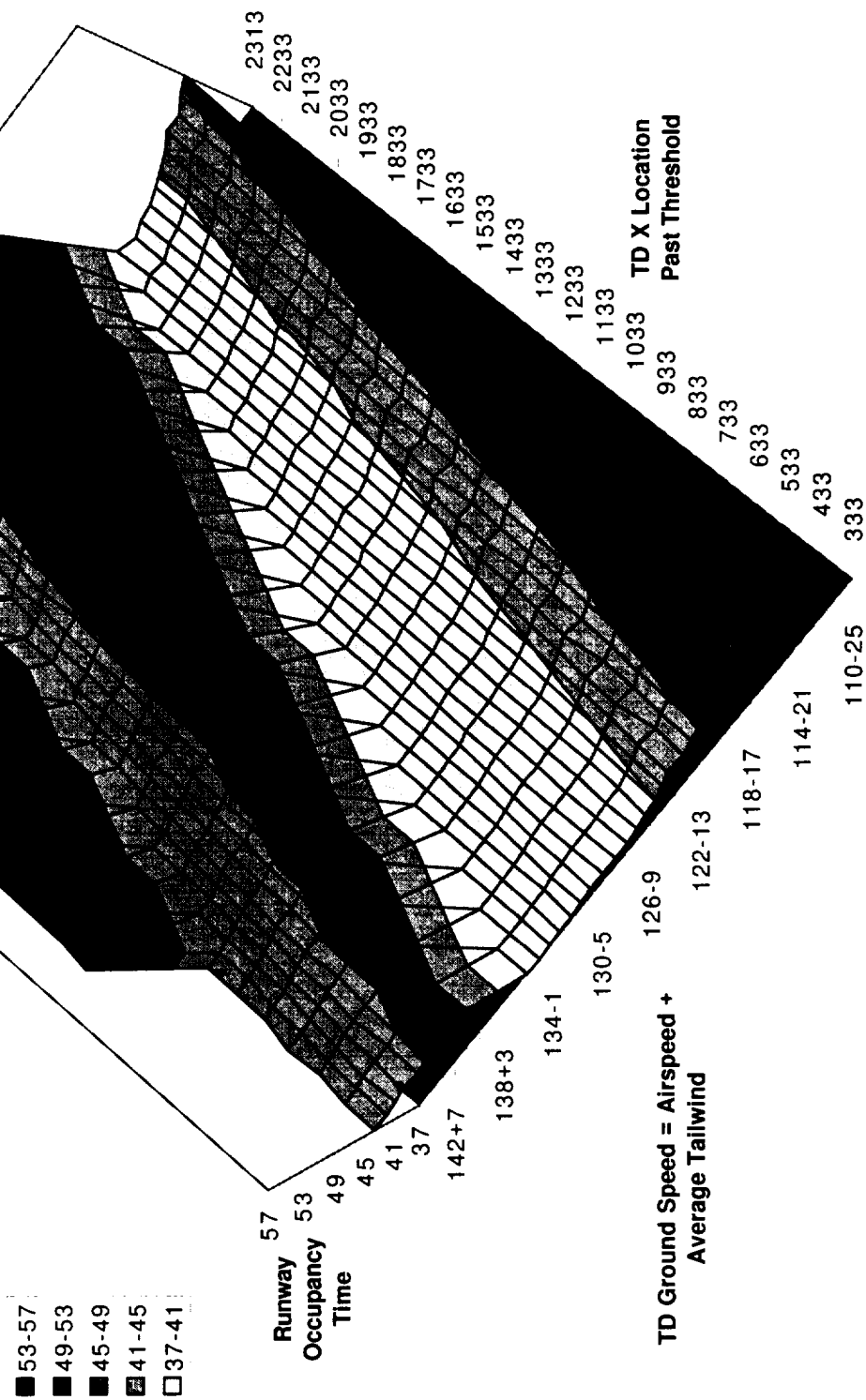
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

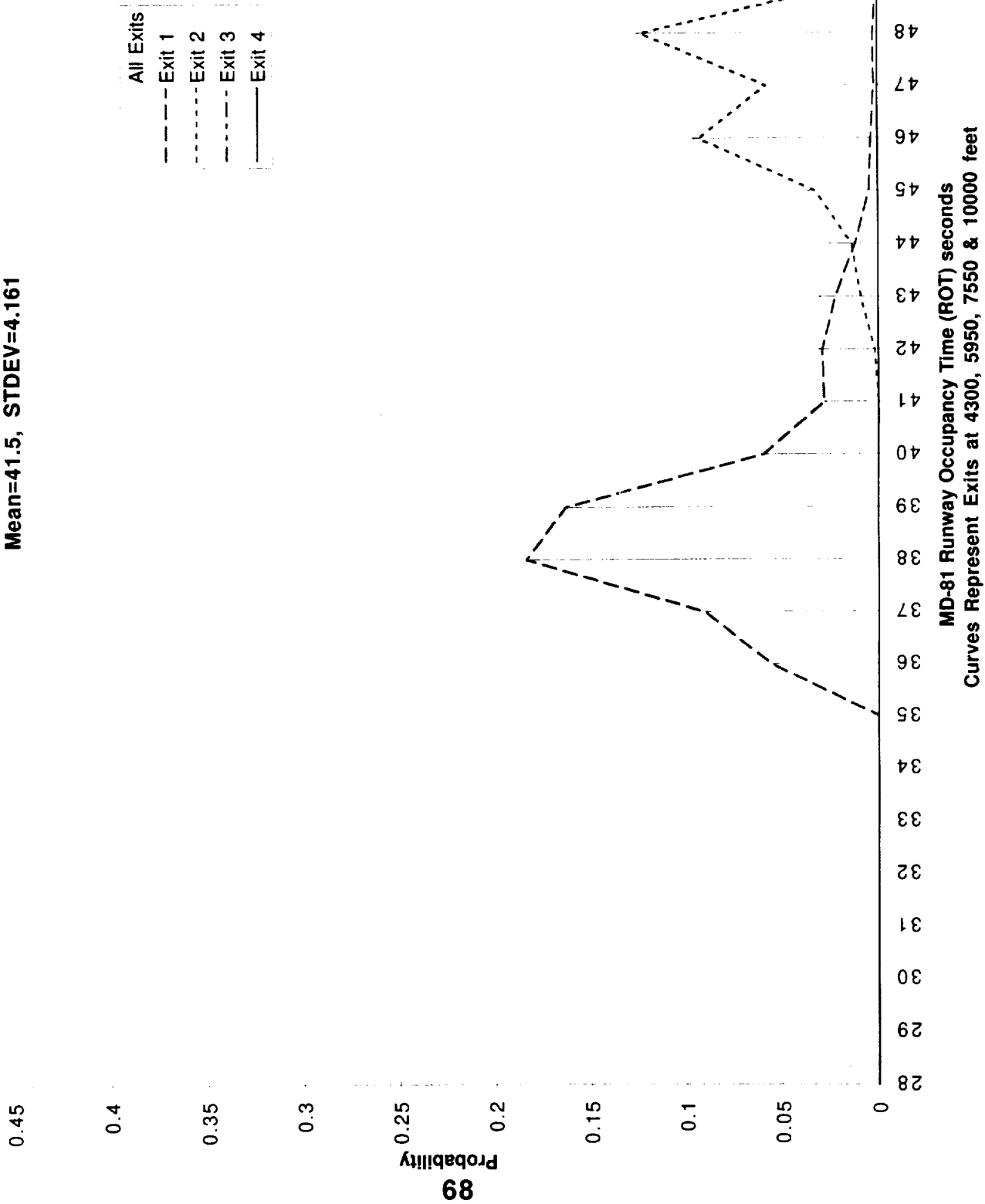
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4300, 5950, 7550, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=41.5, STDEV=4.161



Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

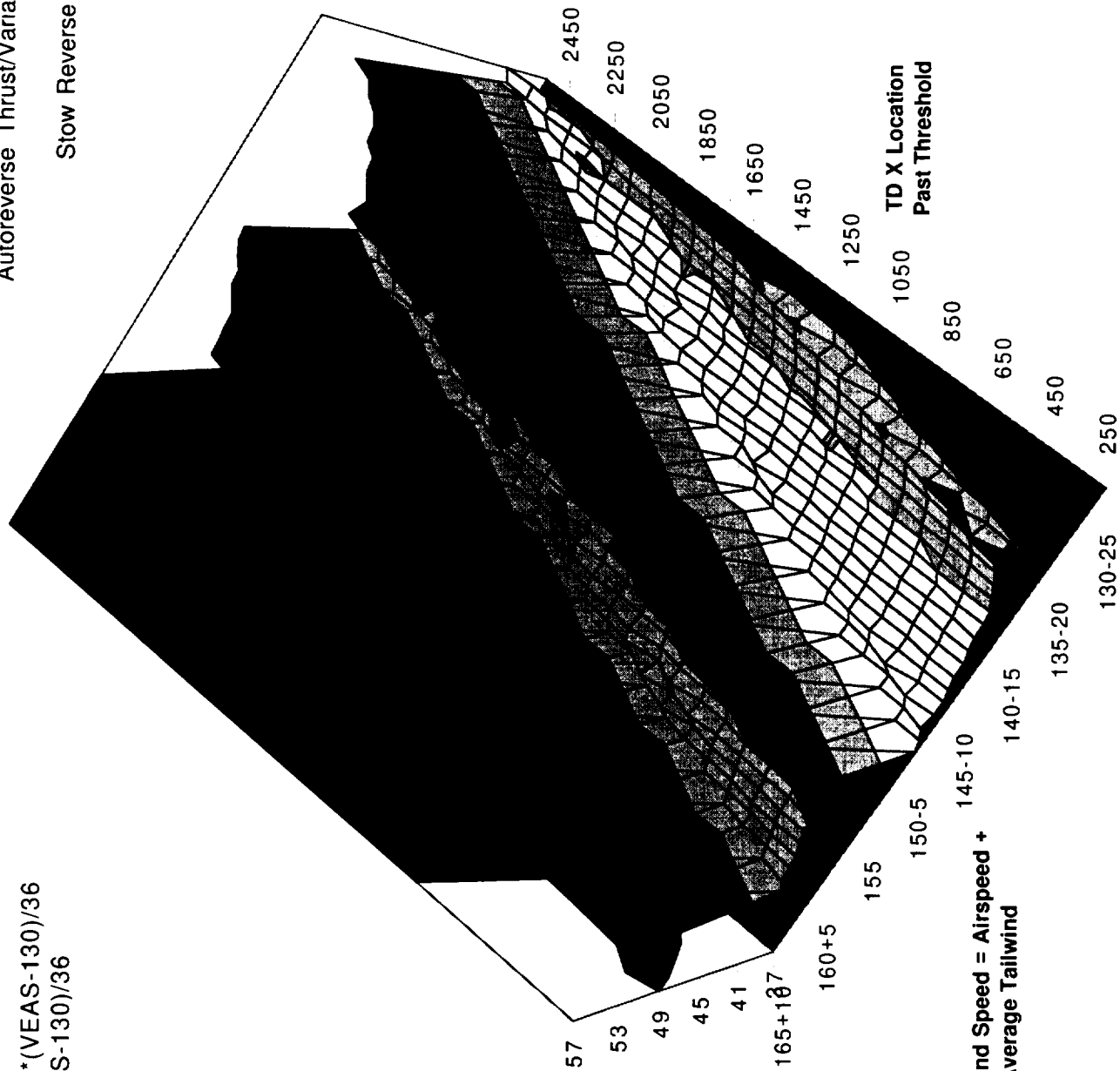
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Full Flaps
Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

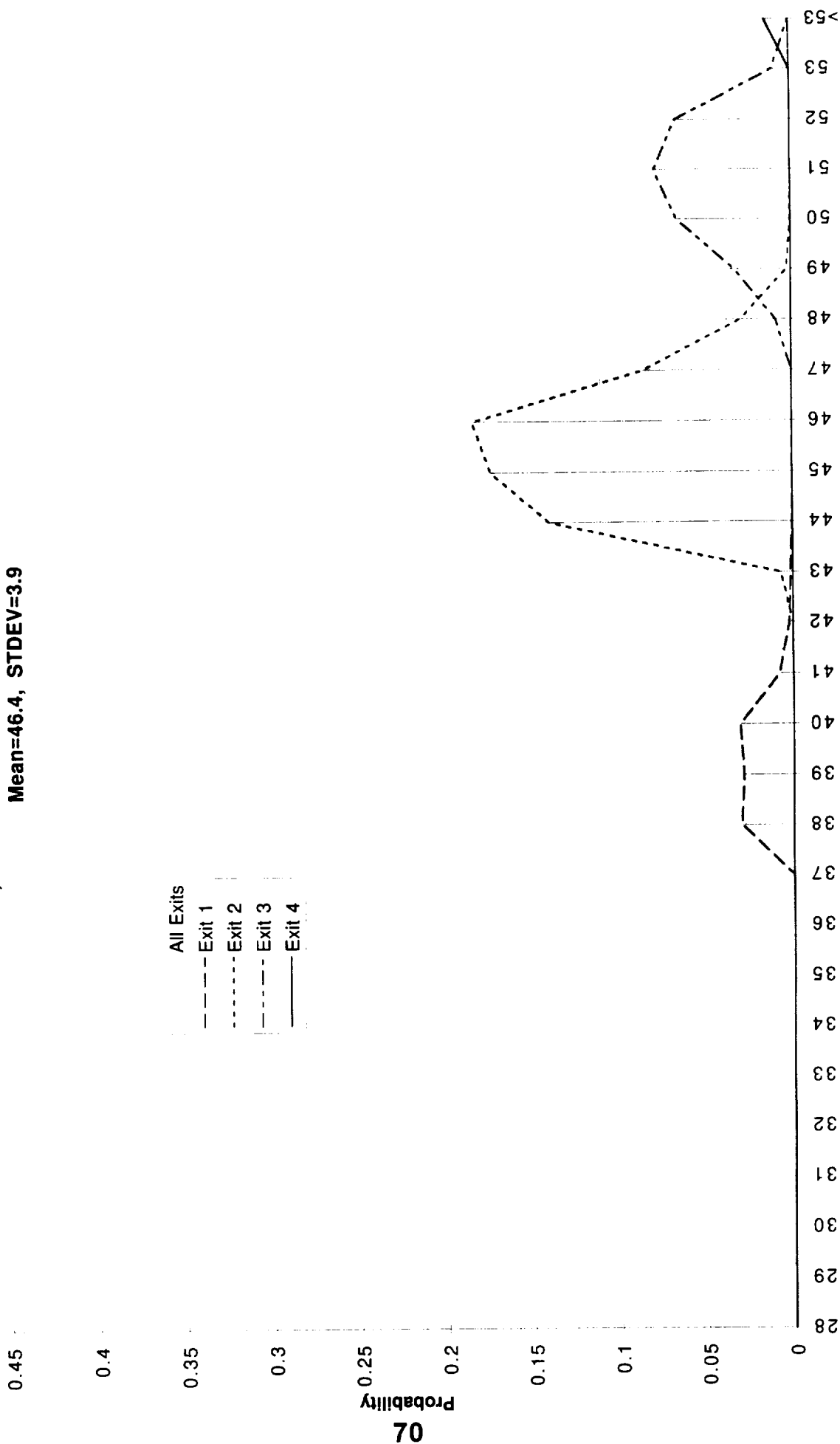
Runway
Occupancy
Time



TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/full flaps
Mean=46.4, STDEV=3.9



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

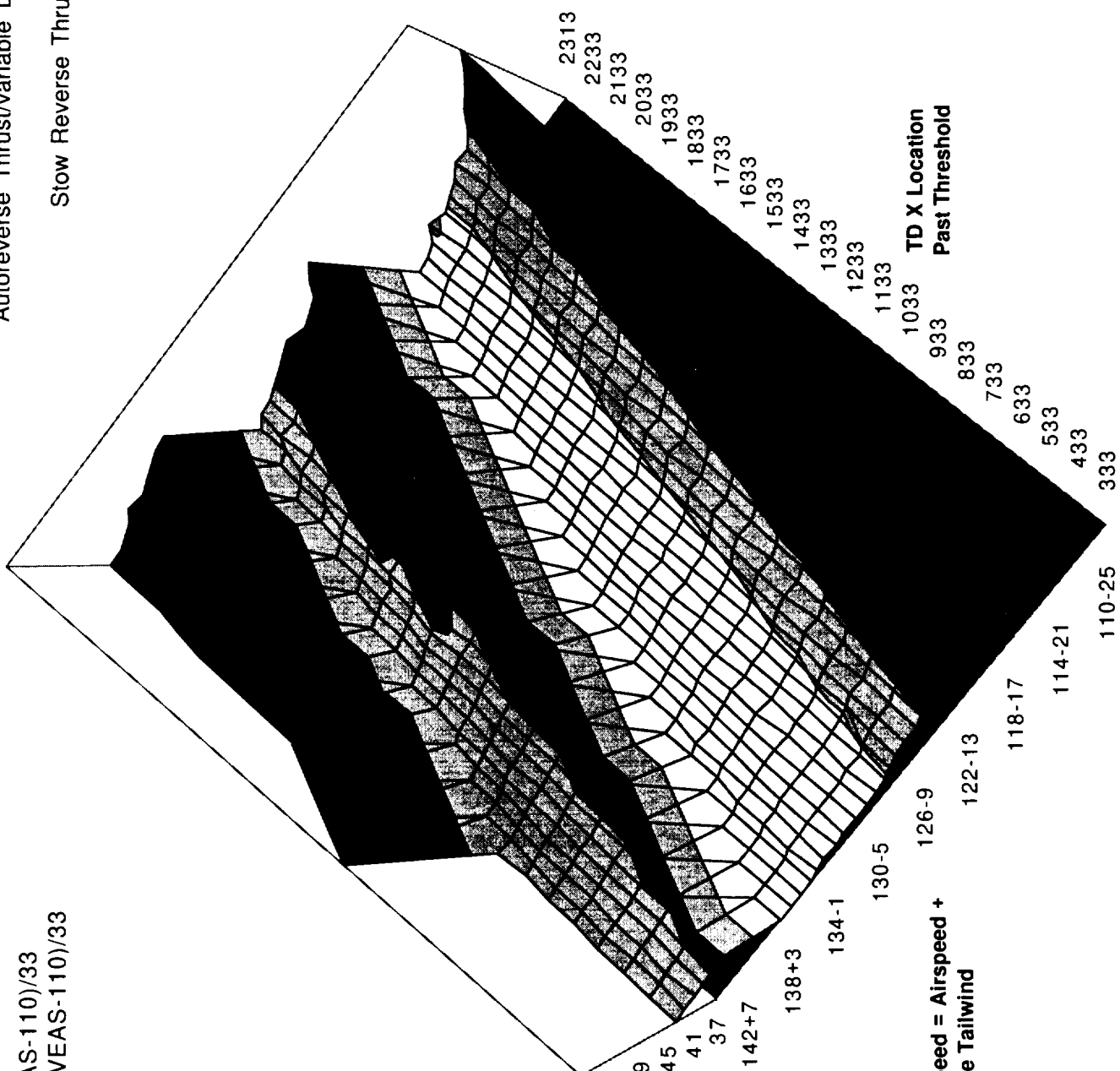
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Full Flaps
Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

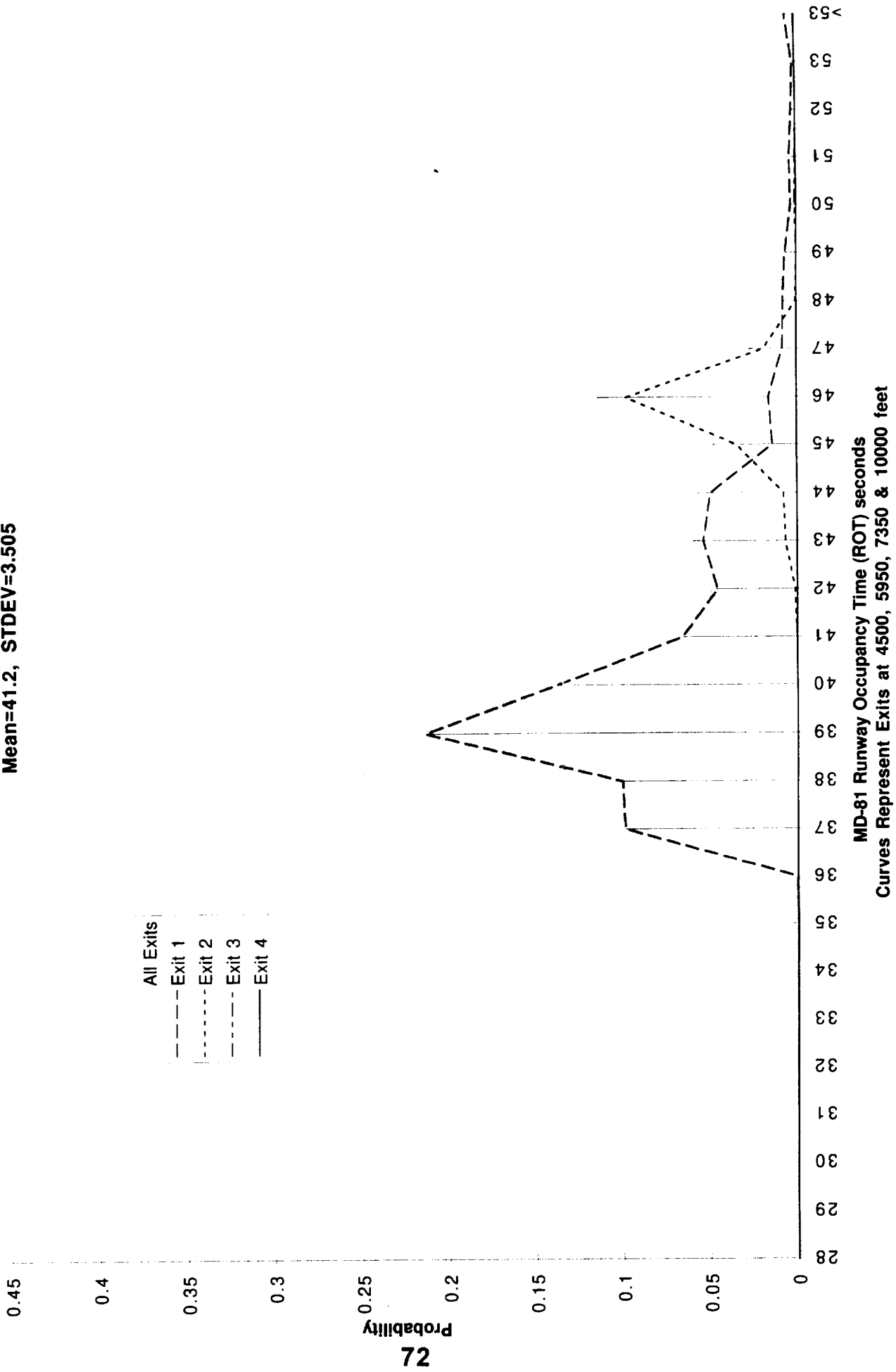
Runway
Occupancy
Time



TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/full flaps
Mean=41.2, STDEV=3.505



No exit prediction

MD-11 ROTO Occupancy Time

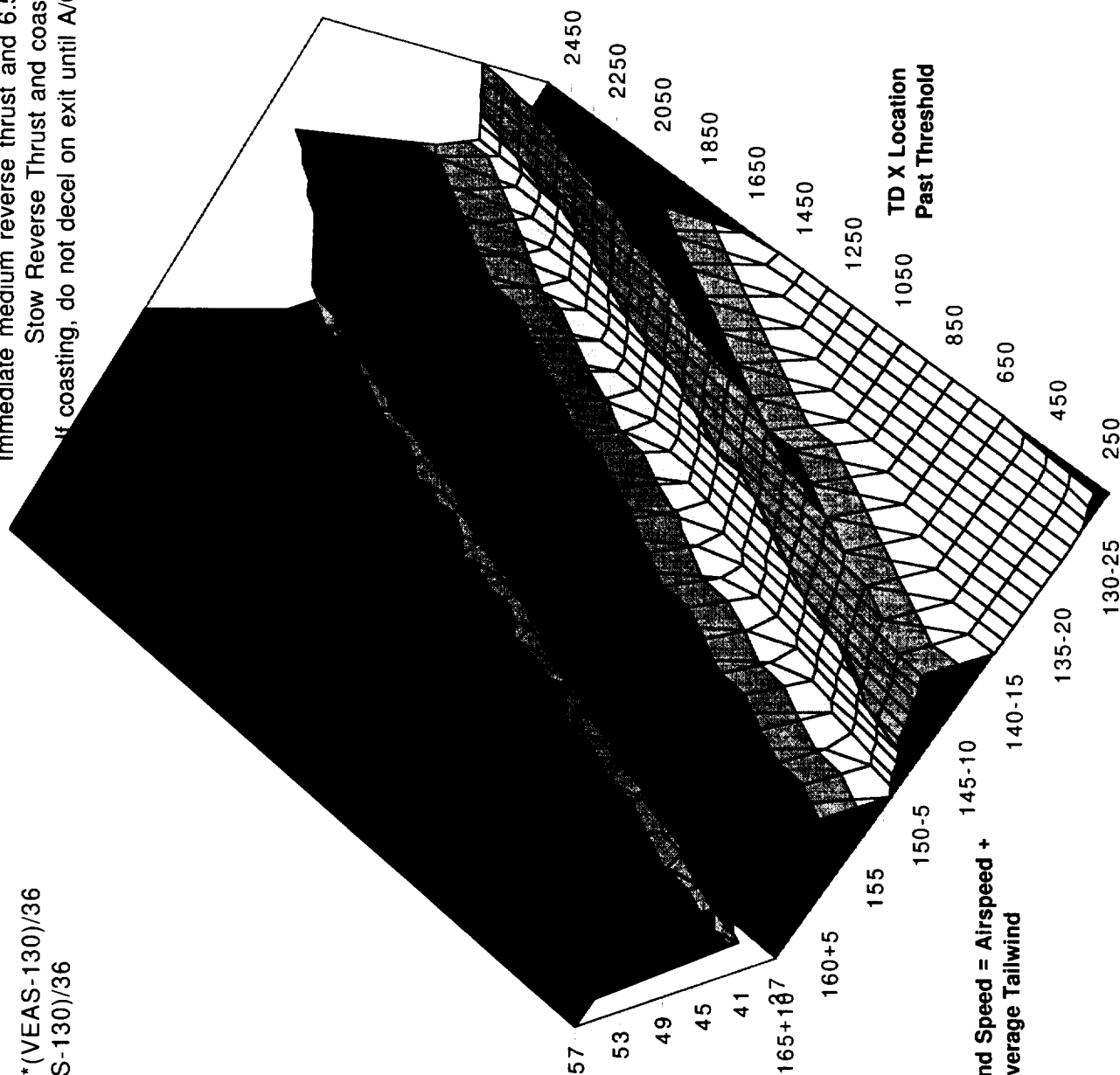
Wet, Exits=3500, 4950, 6550, 10000
 Immediate medium reverse thrust and 6.5 constant decel
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$



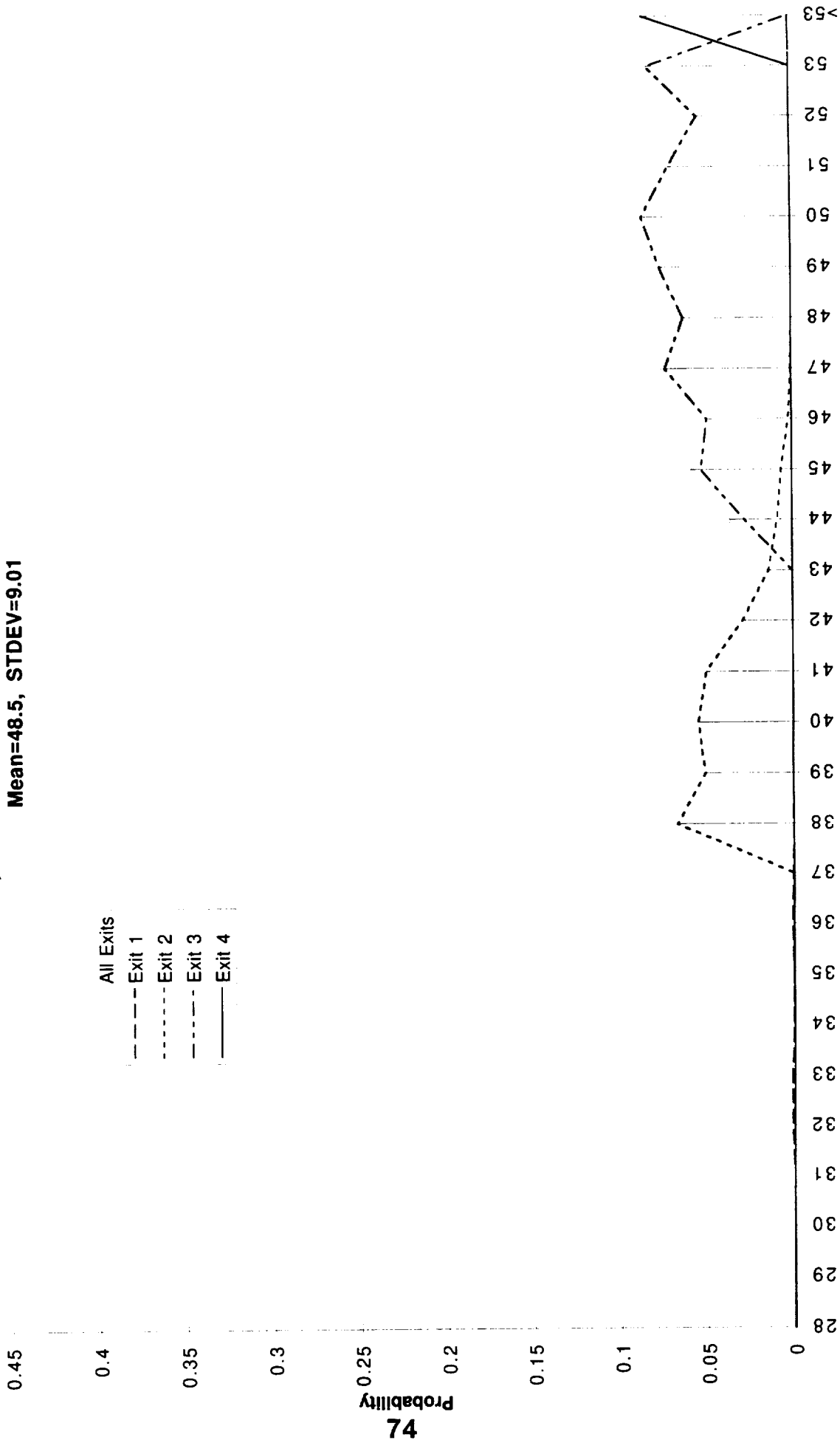
Runway
Occupancy
Time



TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-11 ROTO ROT Probability Distribution
Wet, Medium reverse thrust/constant 6.5 decel
Mean=48.5, STDEV=9.01



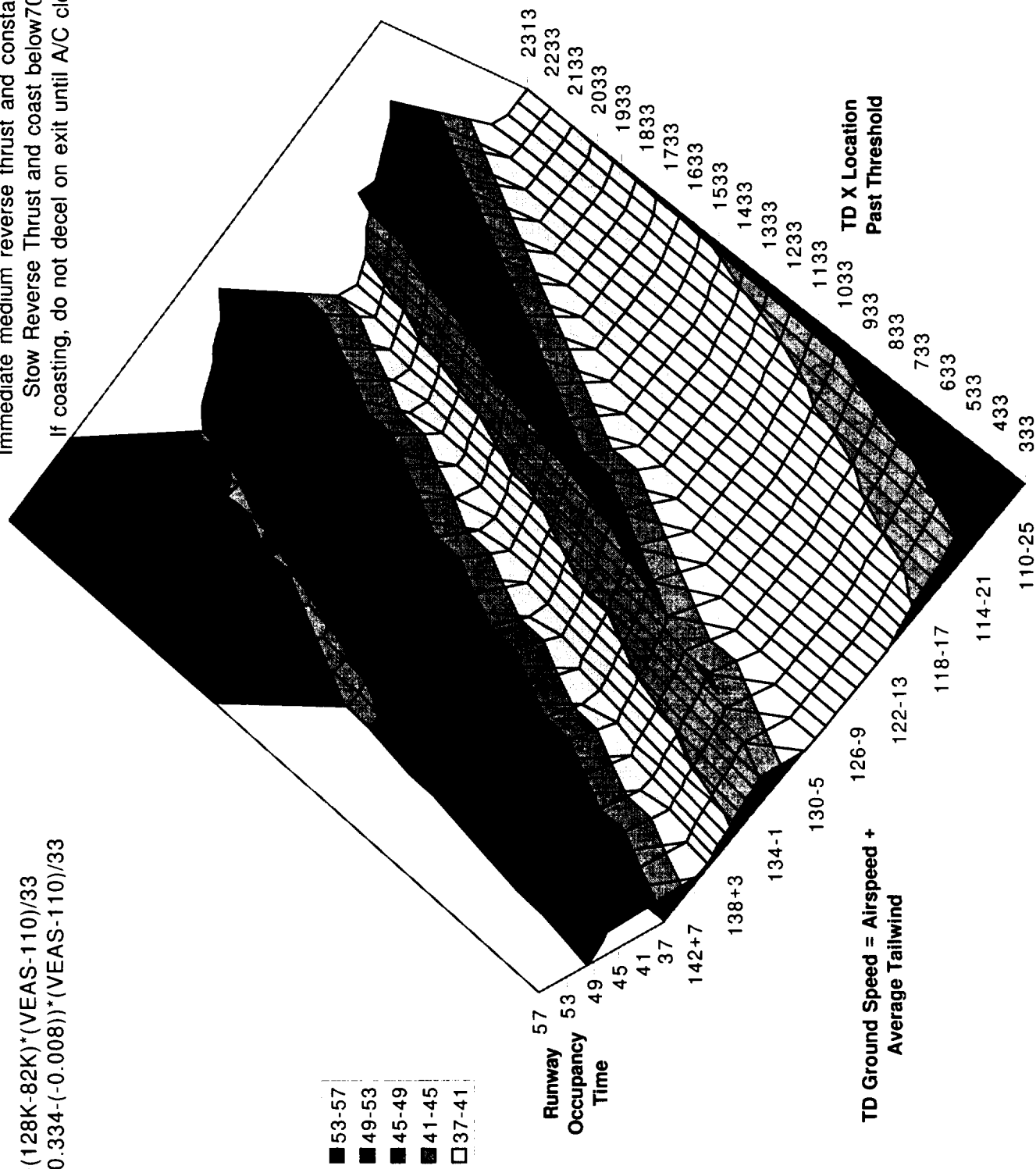
MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3500, 4950, 6550 & 10000 feet

No exit prediction

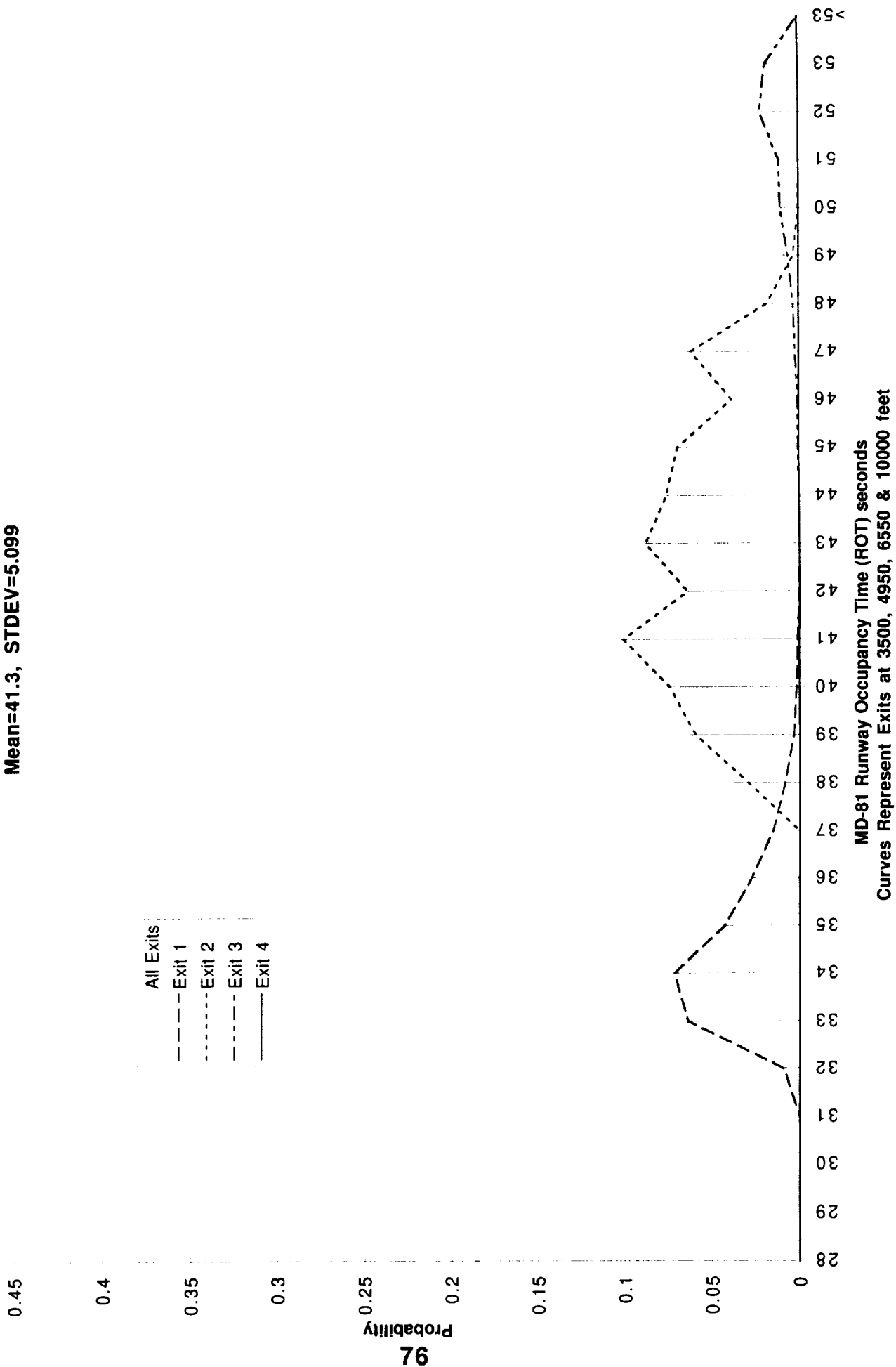
Weight=82K+(128K-82K)*(VEAS-110)/33
CG=-0.008+(0.334-(-0.008))*(VEAS-110)/33

MD-81 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Immediate medium reverse thrust and constant 6.5 decel
Stow Reverse Thrust and coast below 70 kt gnd spd
If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
Wet, Medium reverse thrust/constant 6.5 decel
Mean=41.3, STDEV=5.099



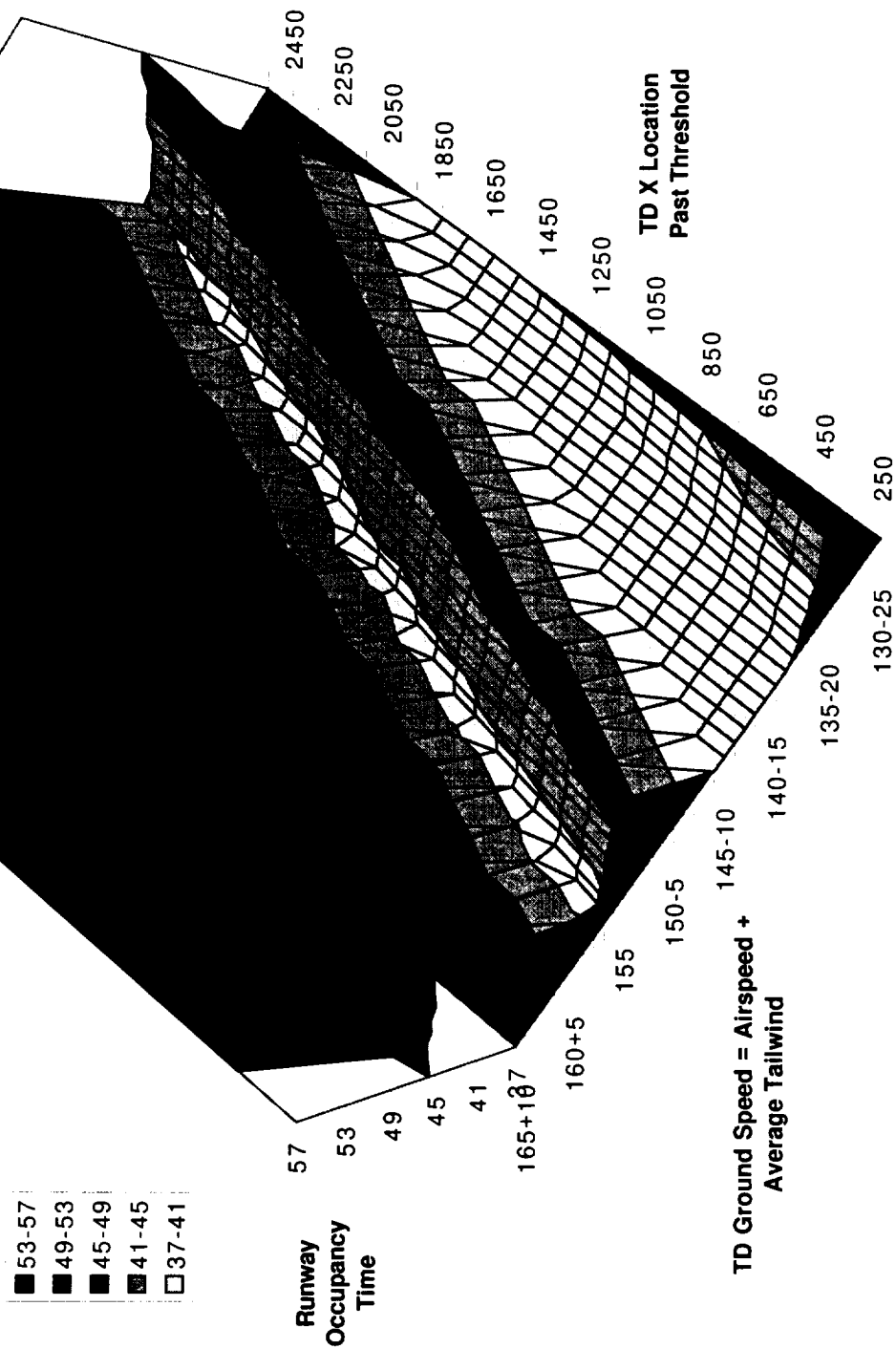
No exit prediction

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

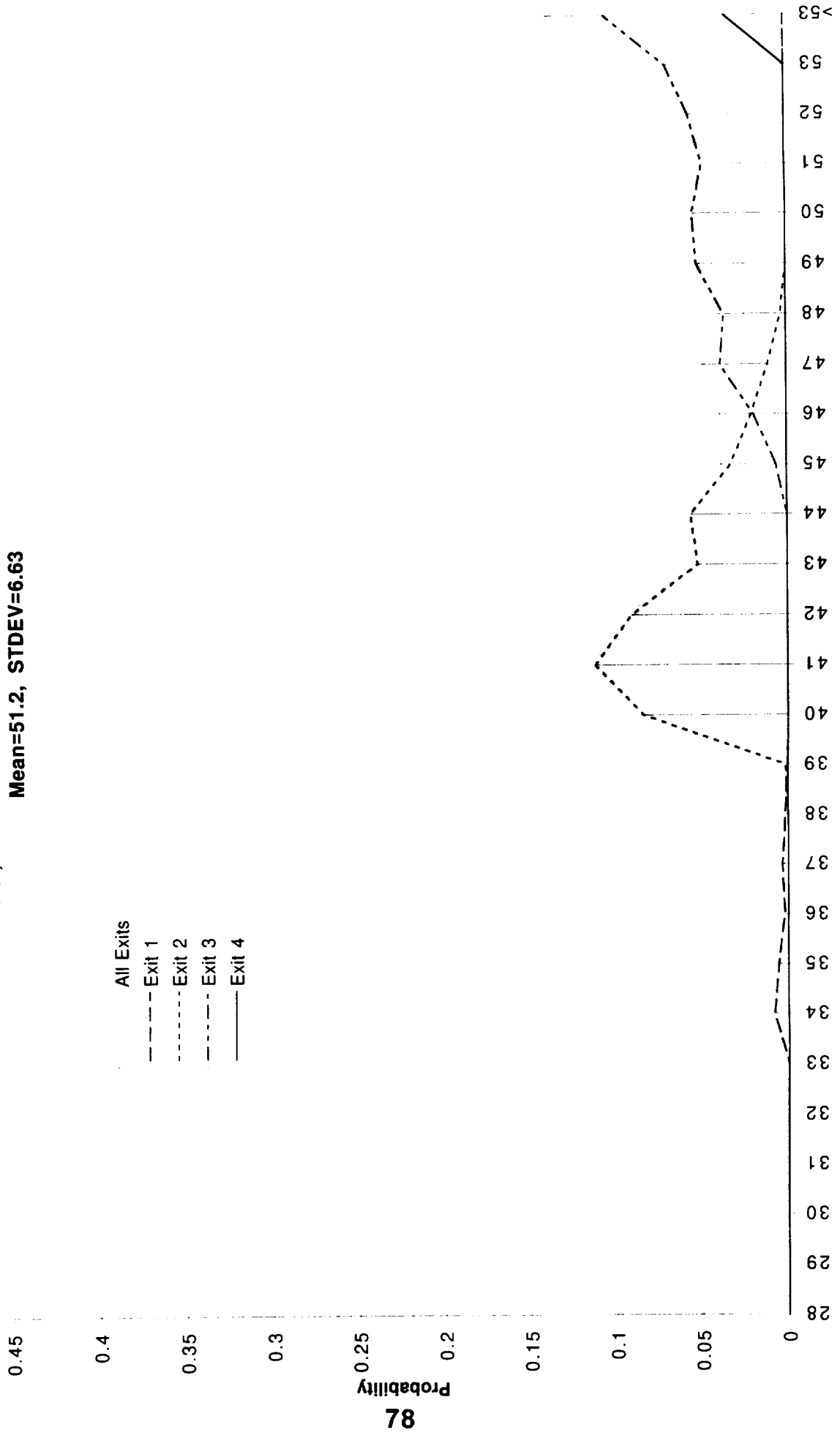
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
 Immediate medium reverse thrust and 6.5 constant decel
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Wet, Medium reverse thrust/constant 6.5 decel
Mean=51.2, STDEV=6.63



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3900, 5350, 6950 & 10000 feet

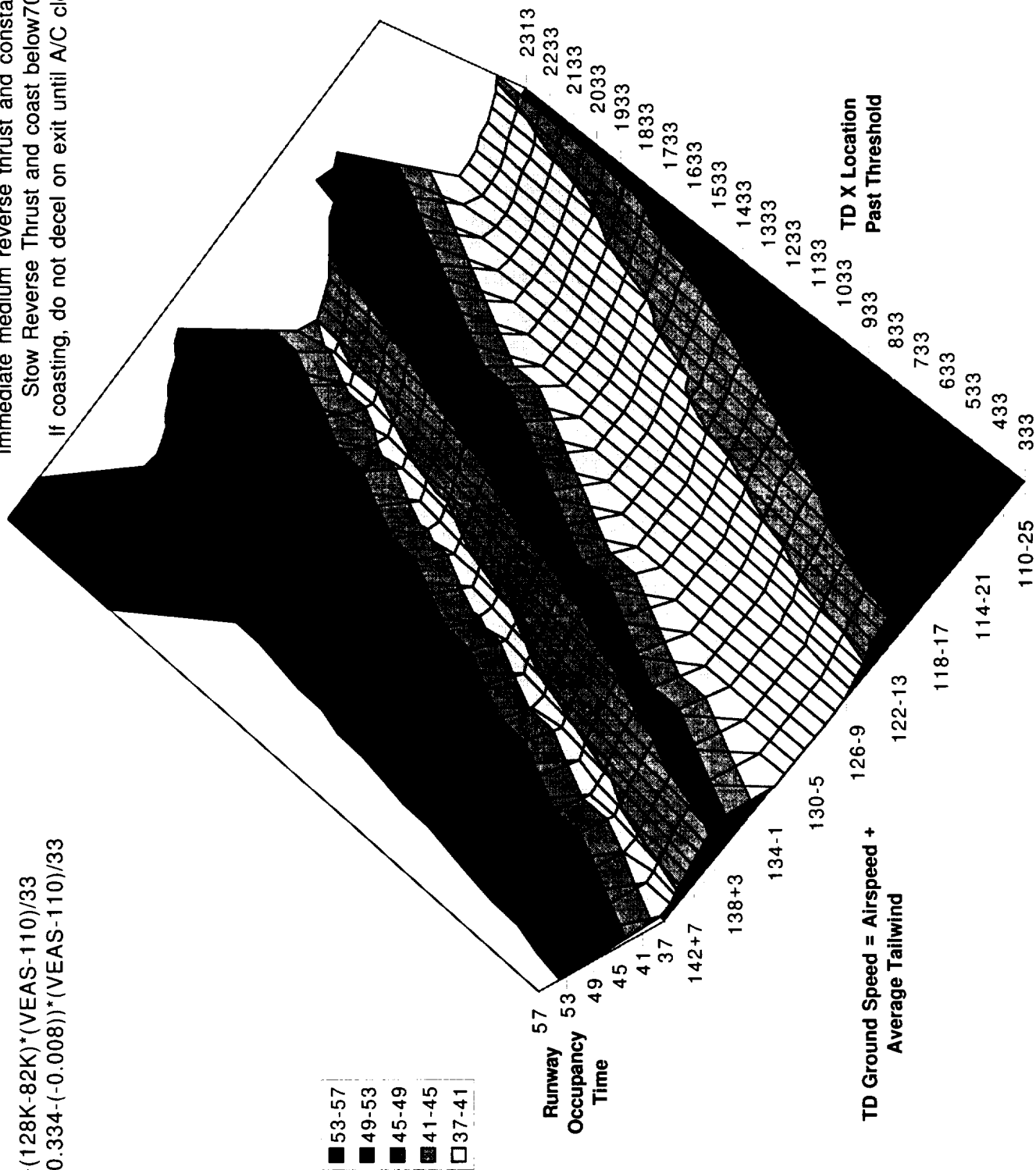
No exit prediction

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

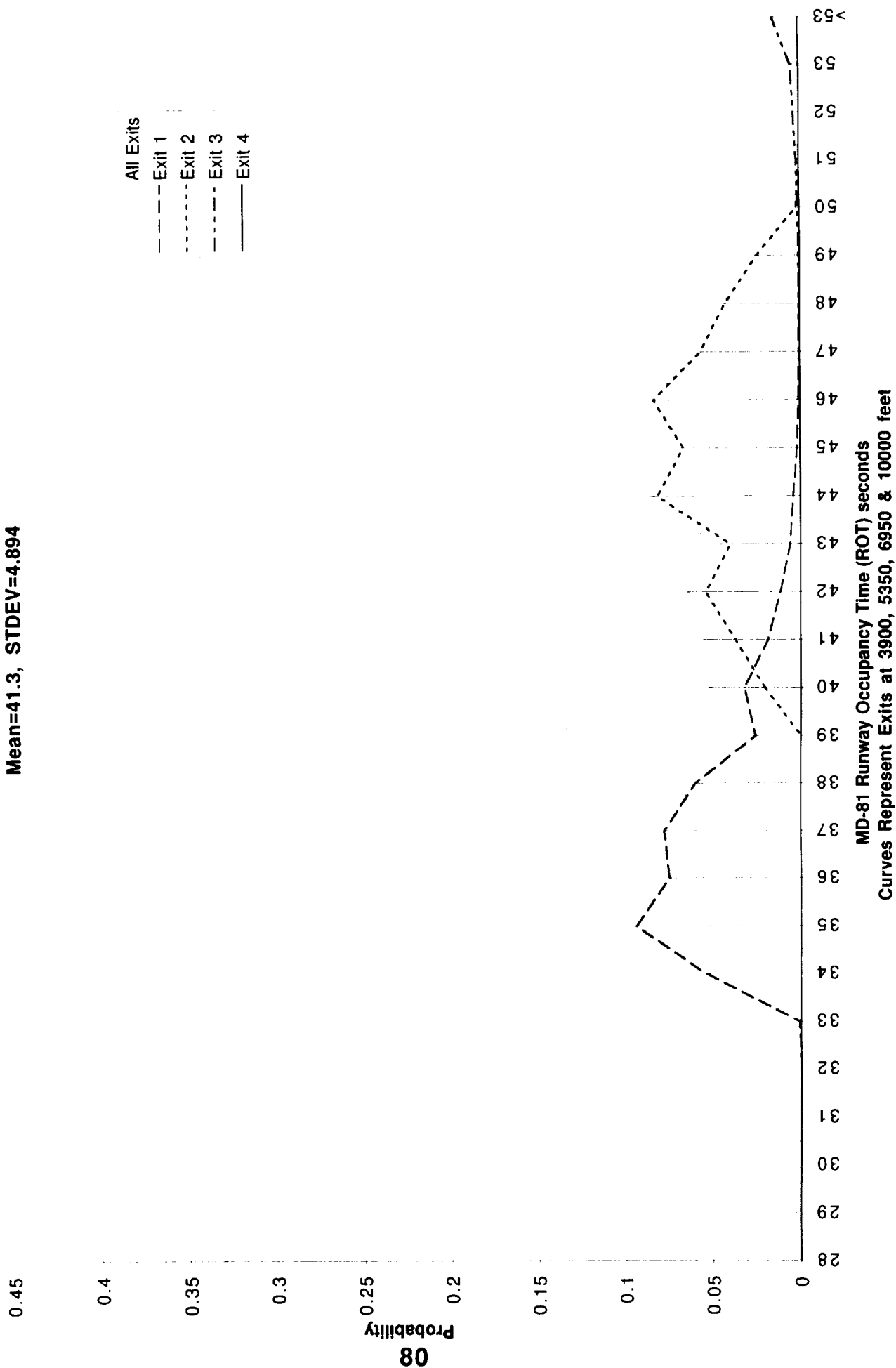
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits = 3900, 5350, 6950, 10000
 Immediate medium reverse thrust and constant 6.5 decel
 Stow Reverse Thrust and coast below 70 kt gnd spd
 If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
Wet, Medium reverse thrust/constant 6.5 decel
Mean=41.3, STDEV=4.894



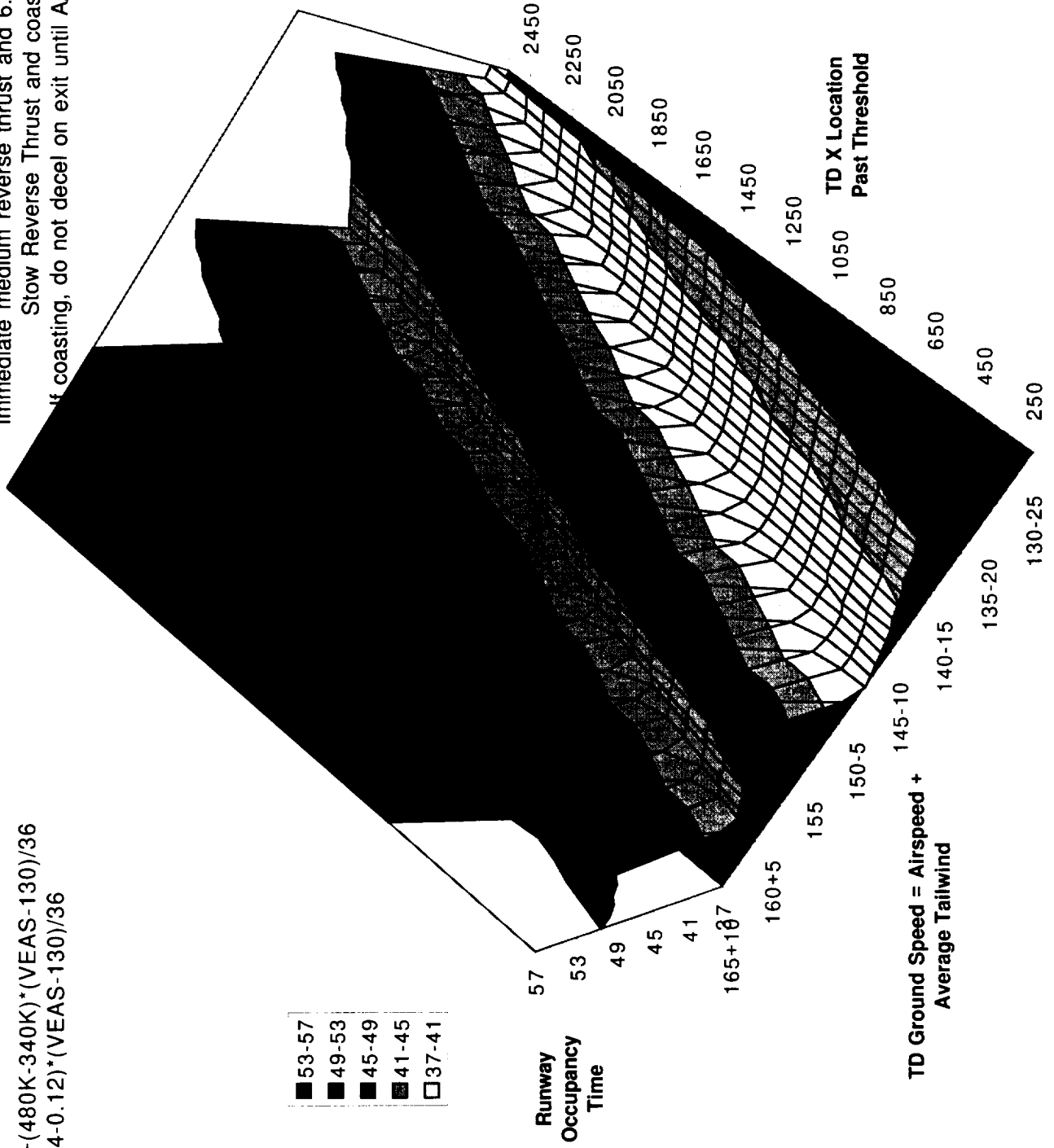
No exit prediction

$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$

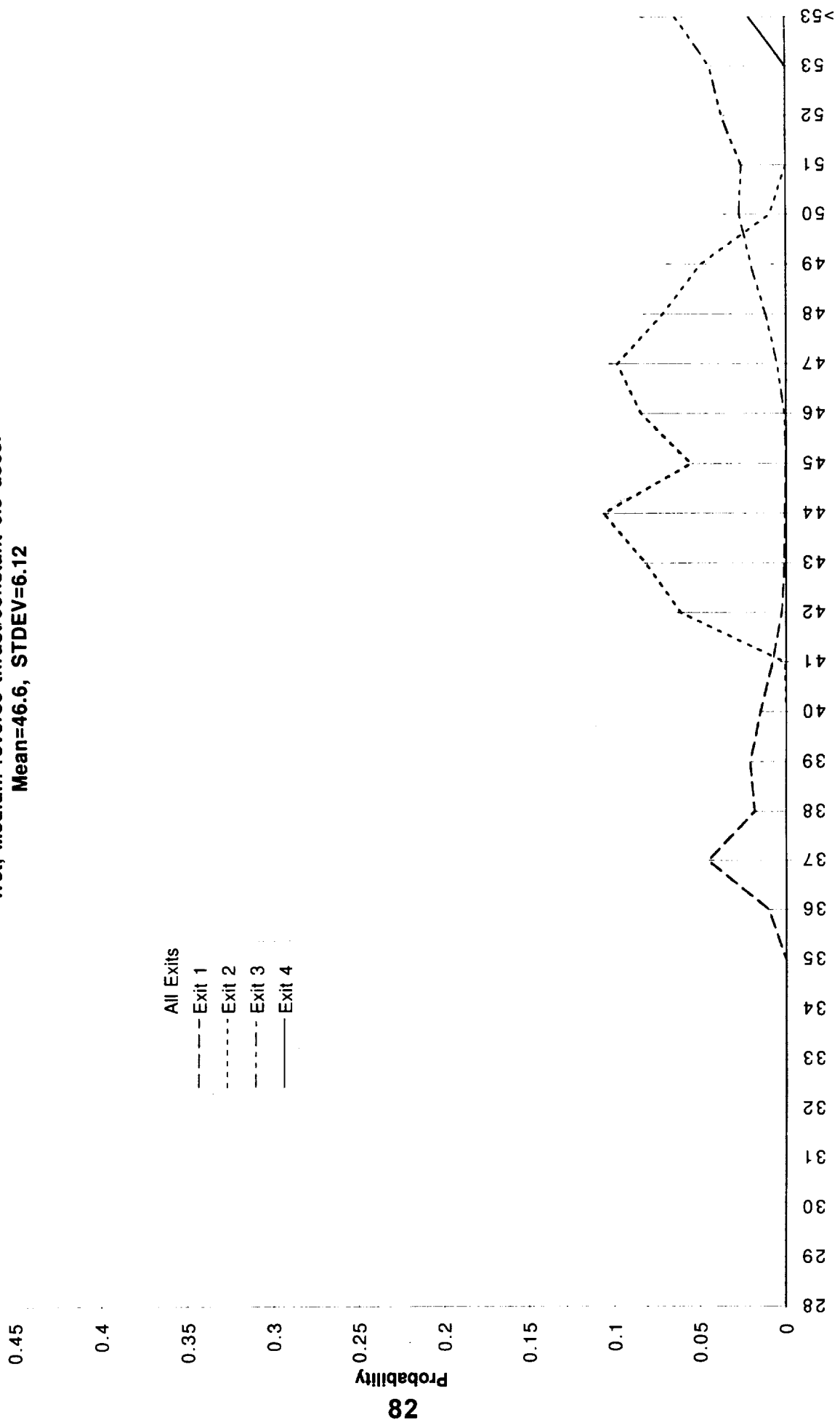
$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
 Immediate medium reverse thrust and 6.5 constant decel
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Wet, Medium reverse thrust/constant 6.5 decel
Mean=46.6, STDEV=6.12



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

No exit prediction

$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$

$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$

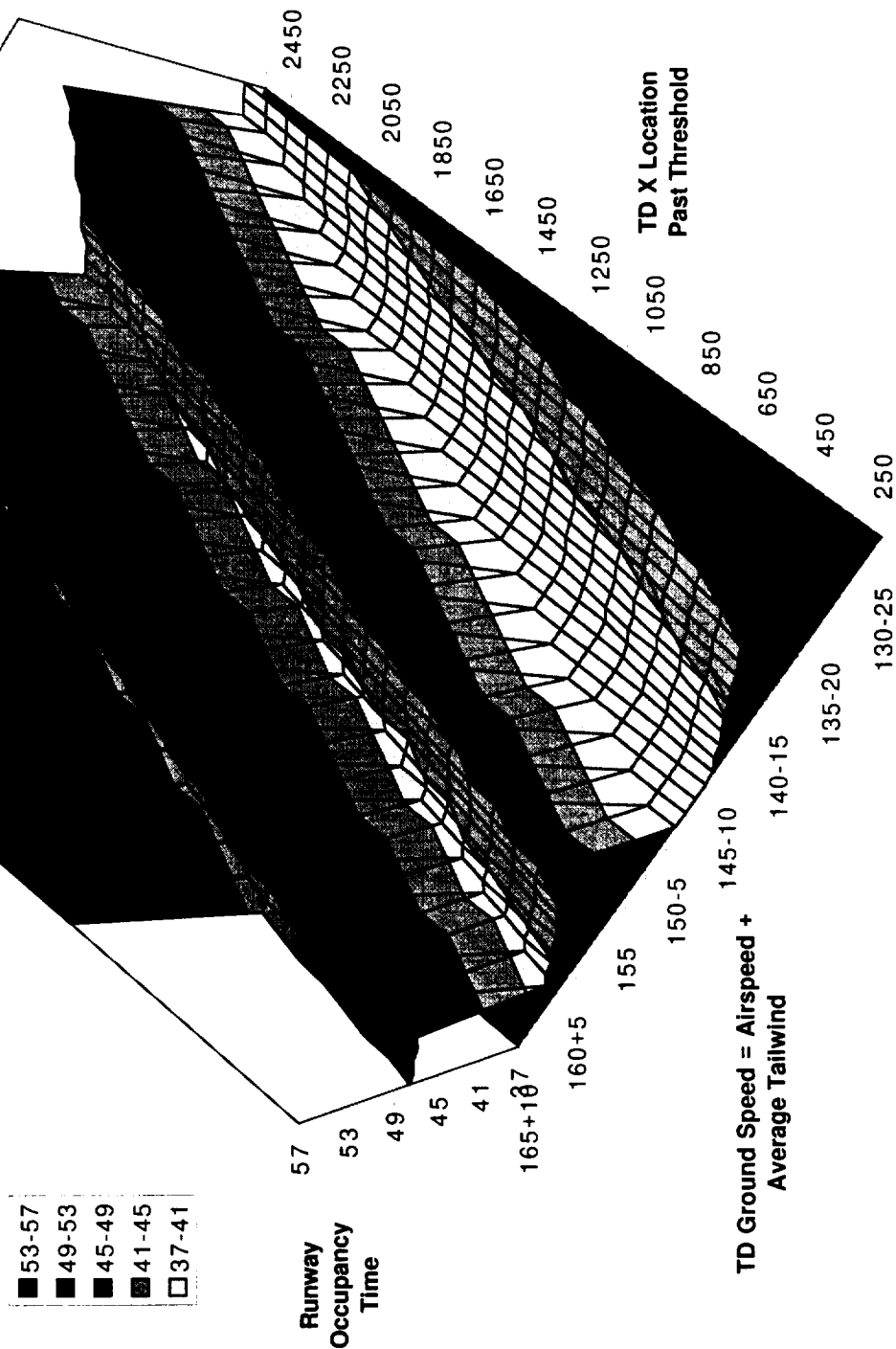
MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000

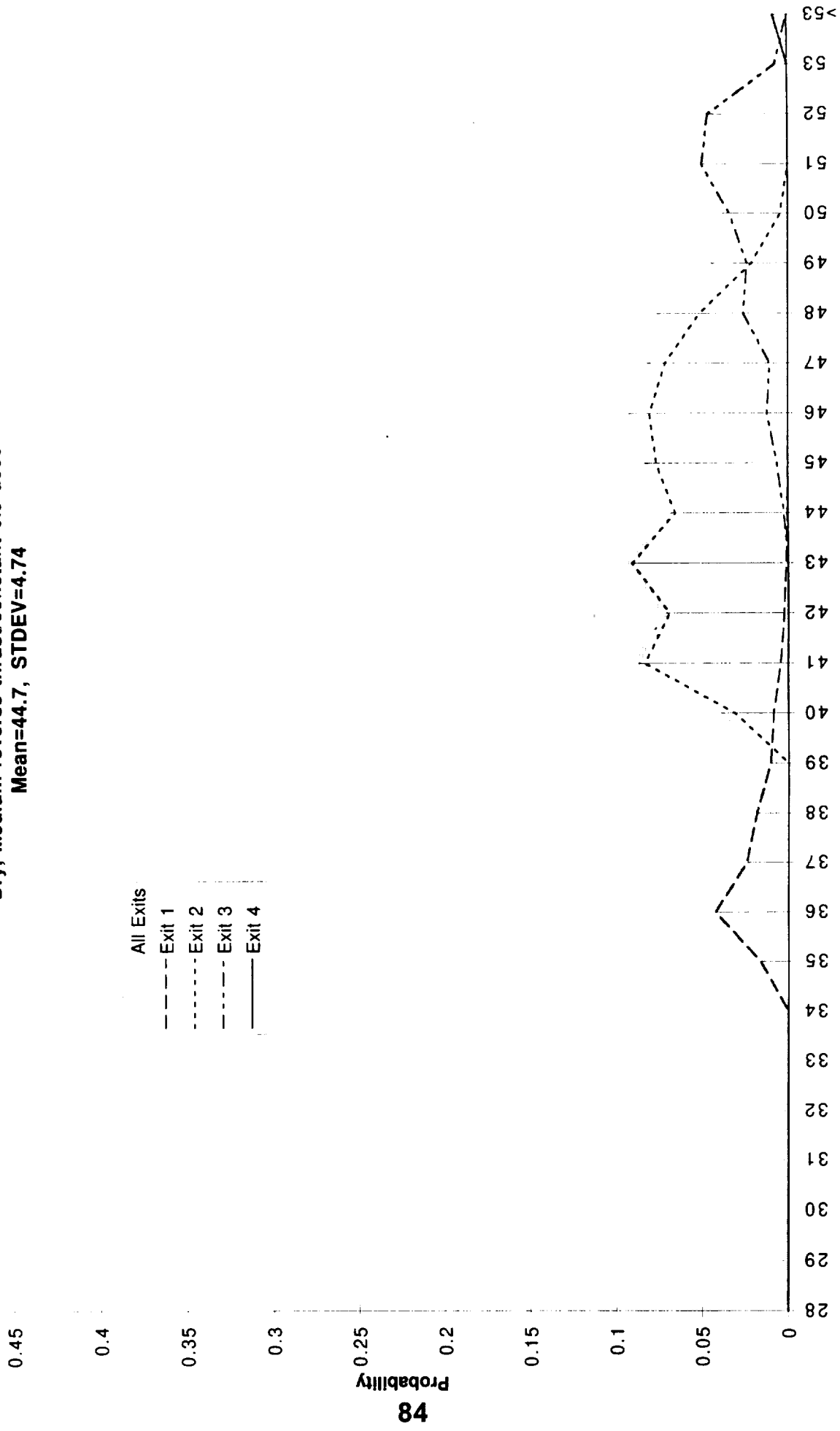
Immediate medium reverse thrust and 6.5 constant decel

Stow Reverse Thrust and coast below 70 kt gd

If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Dry, Medium reverse thrust/constant 6.5 decel
Mean=44.7, STDEV=4.74



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

No exit prediction

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

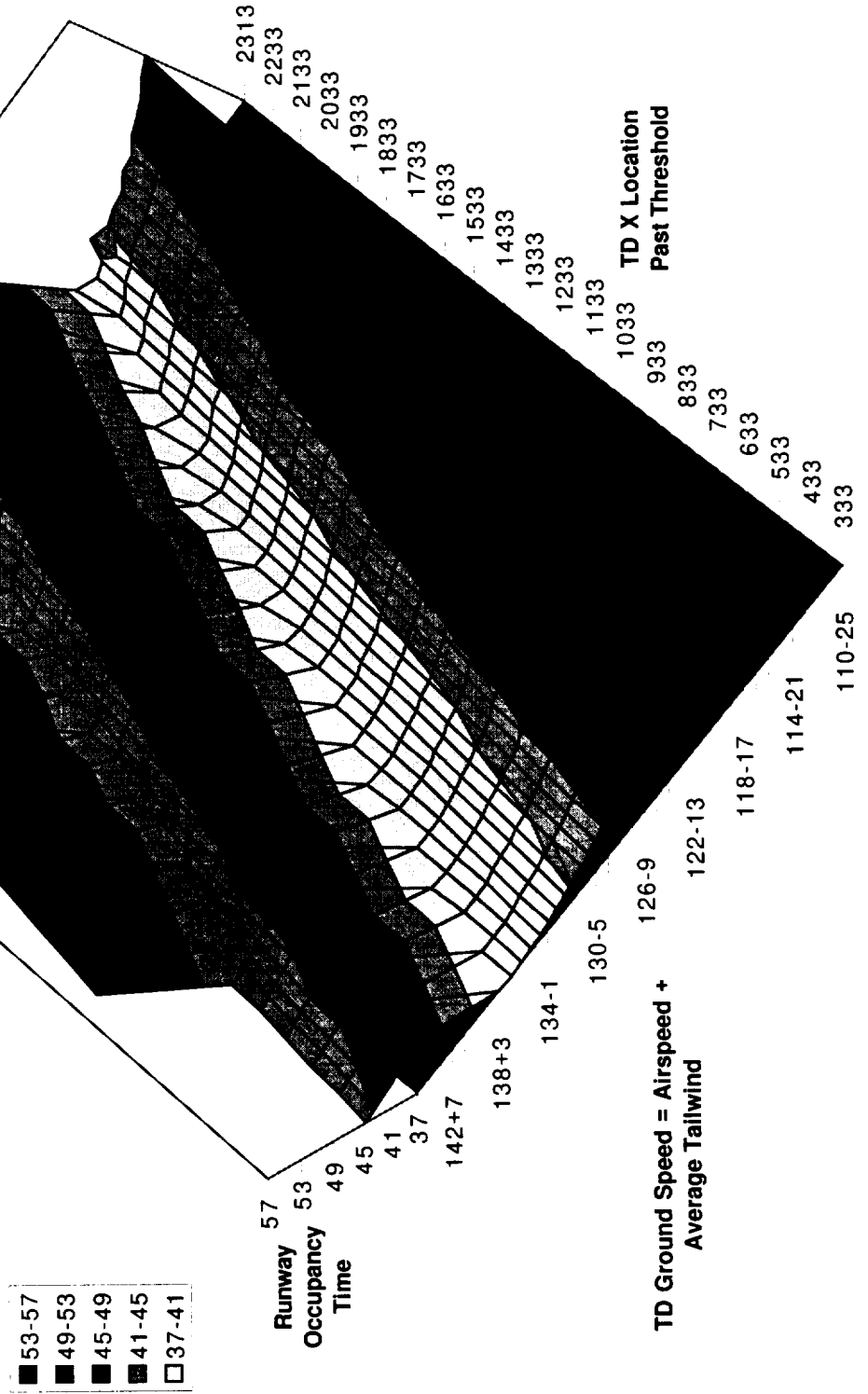
MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000

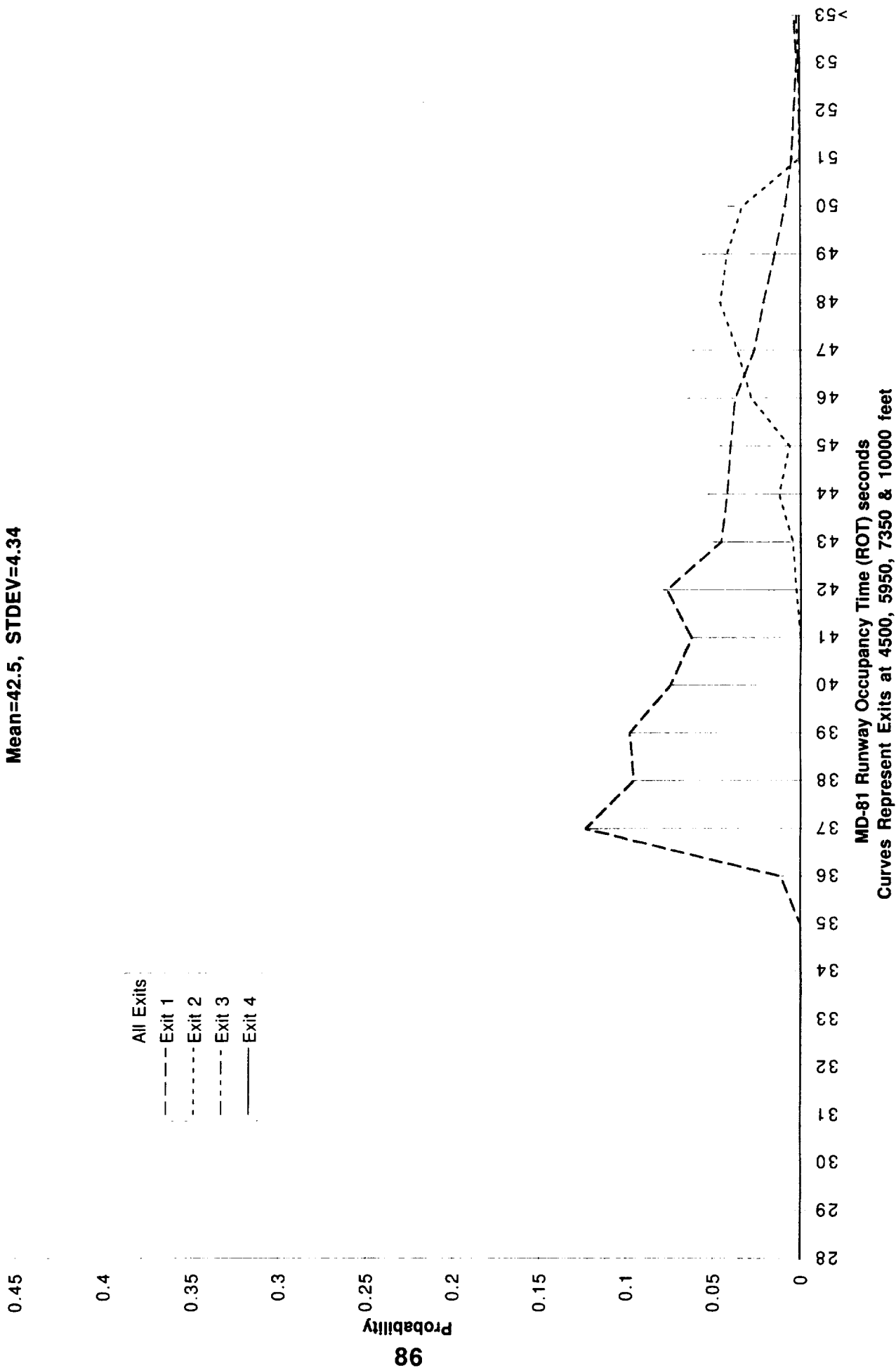
Immediate medium reverse thrust and constant 6.5 decel

Stow Reverse Thrust and coast below 70 kt gnd spd

If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
Wet, Medium reverse thrust/constant 6.5 decel
Mean=42.5, STDEV=4.34



No exit prediction

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

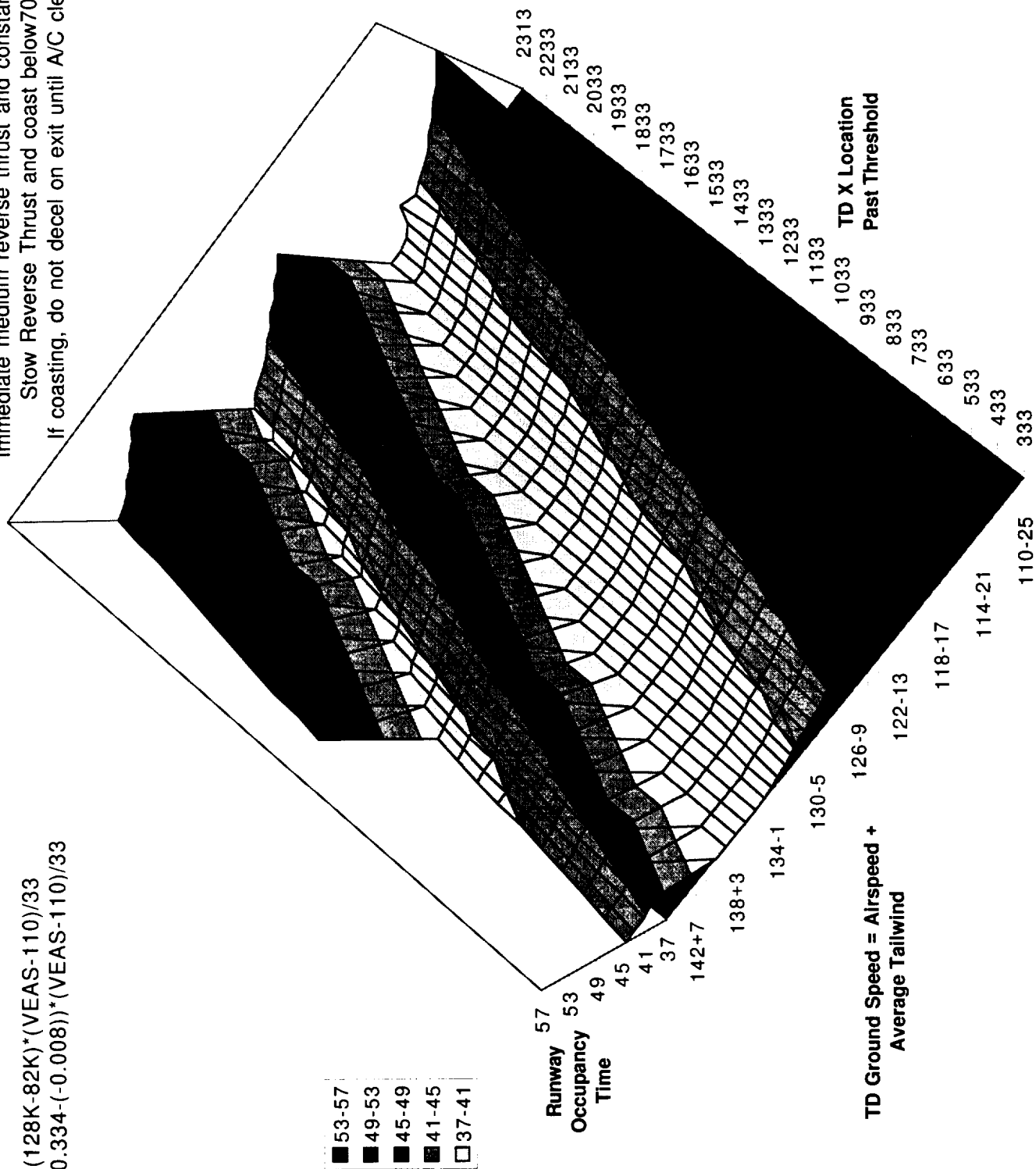
MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000

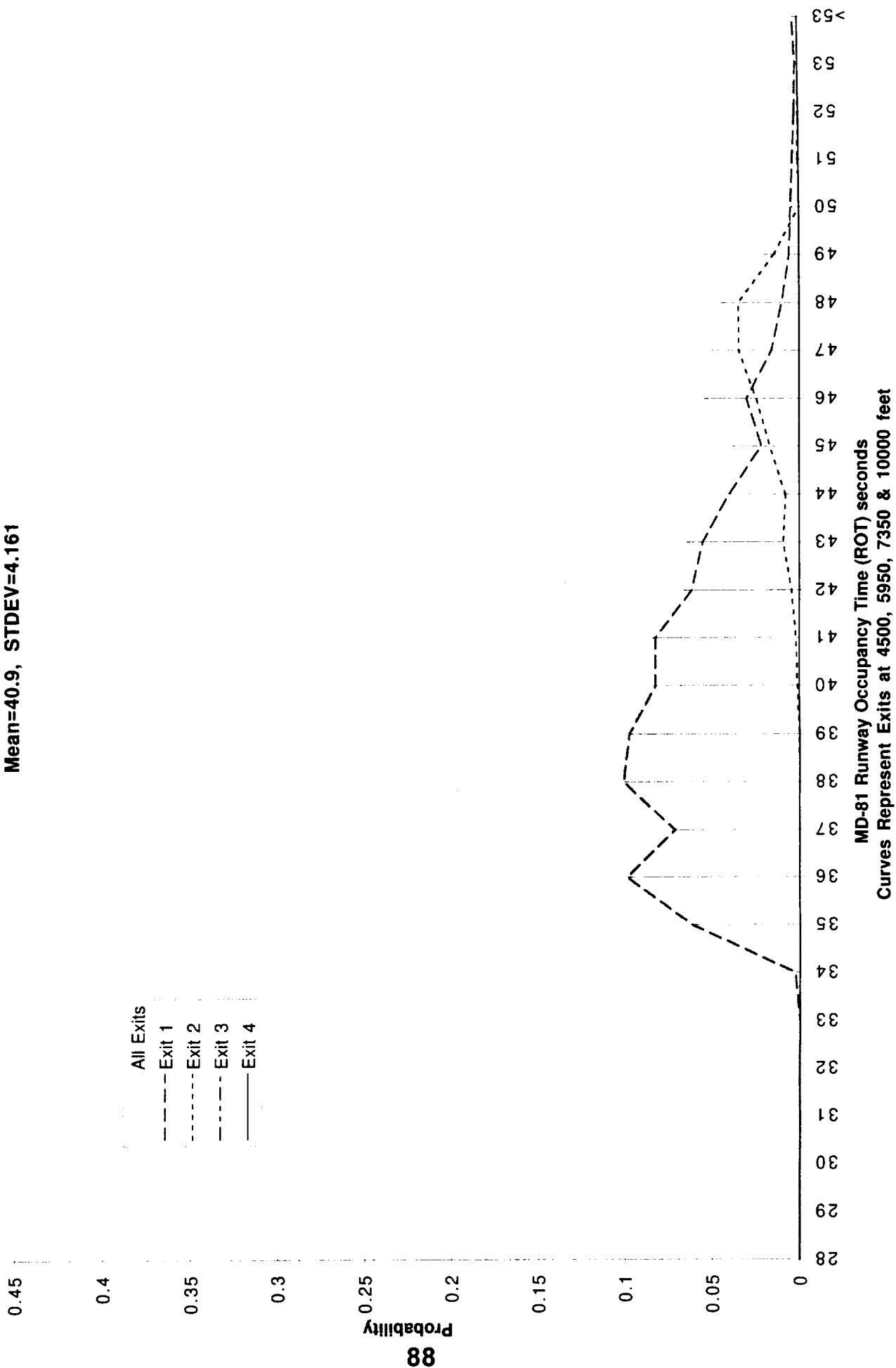
Immediate medium reverse thrust and constant 6.5 decel

Stow Reverse Thrust and coast below 70 kt gnd spd

If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
 Dry, Medium reverse thrust/constant 6.5 decel
 Mean=40.9, STDEV=4.161



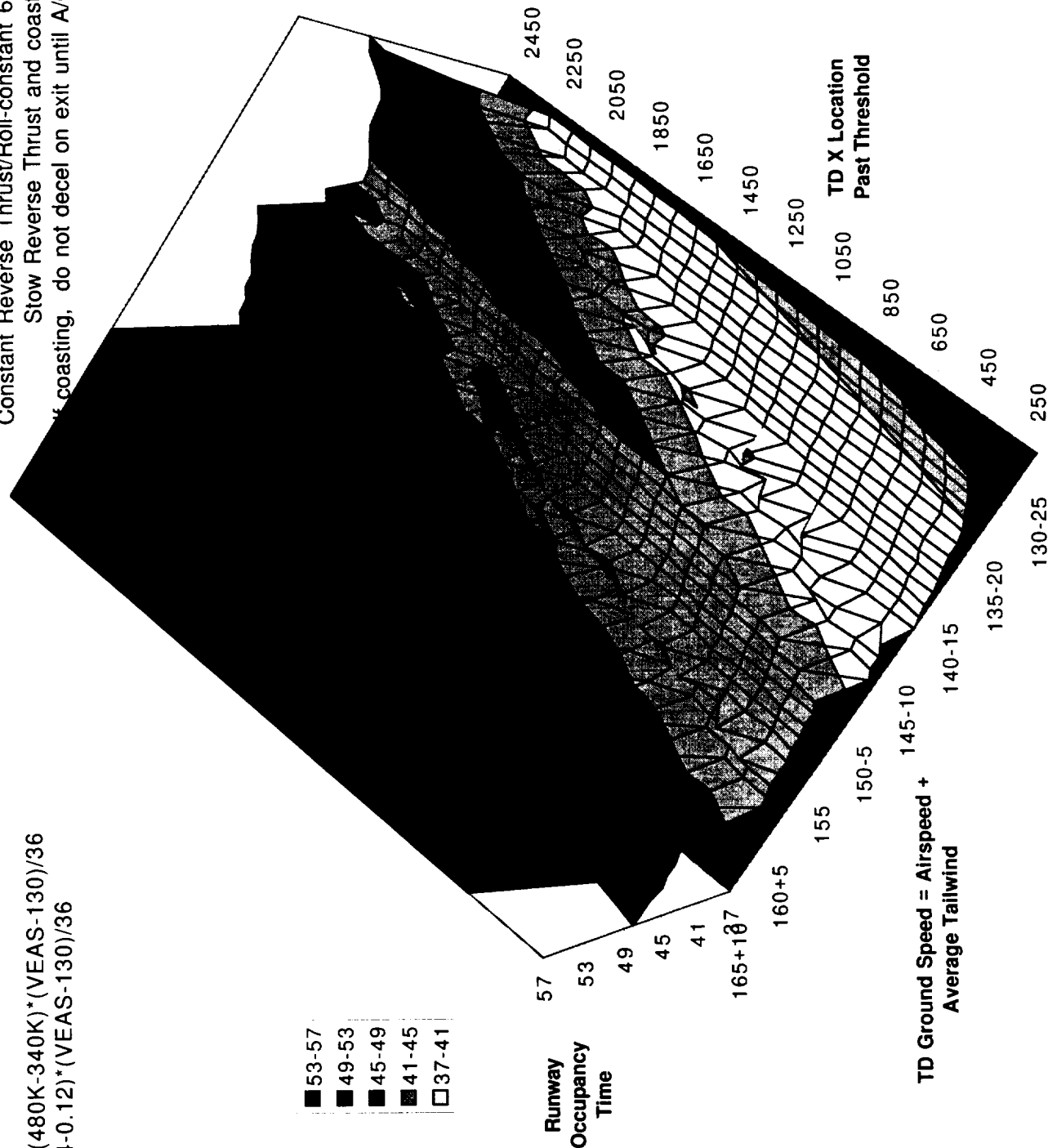
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

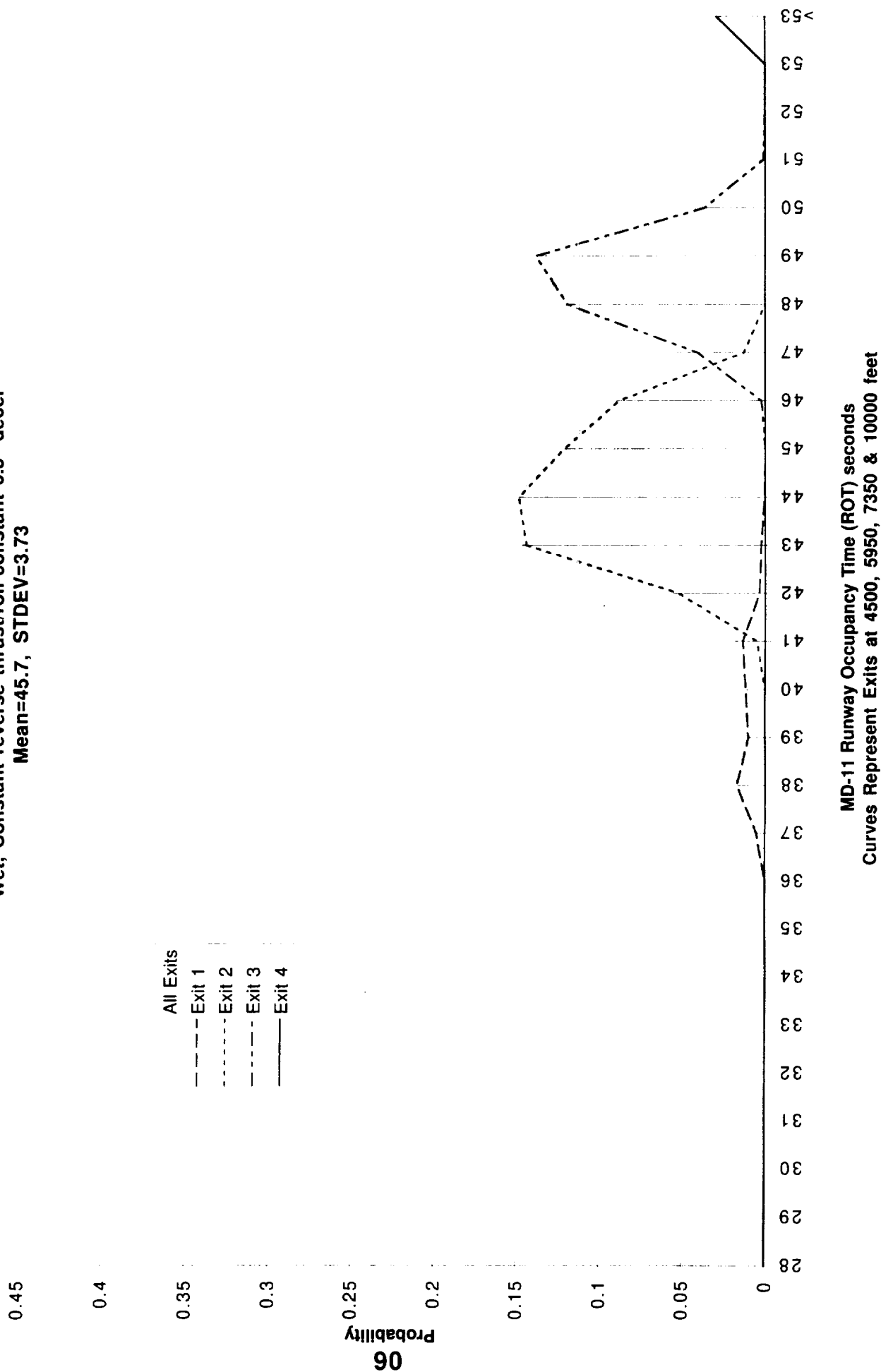
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
 Constant Reverse Thrust/Roll-constant 6.5 Deceleration
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Wet, Constant reverse thrust/roll-constant 6.5 decel
Mean=45.7, STDEV=3.73



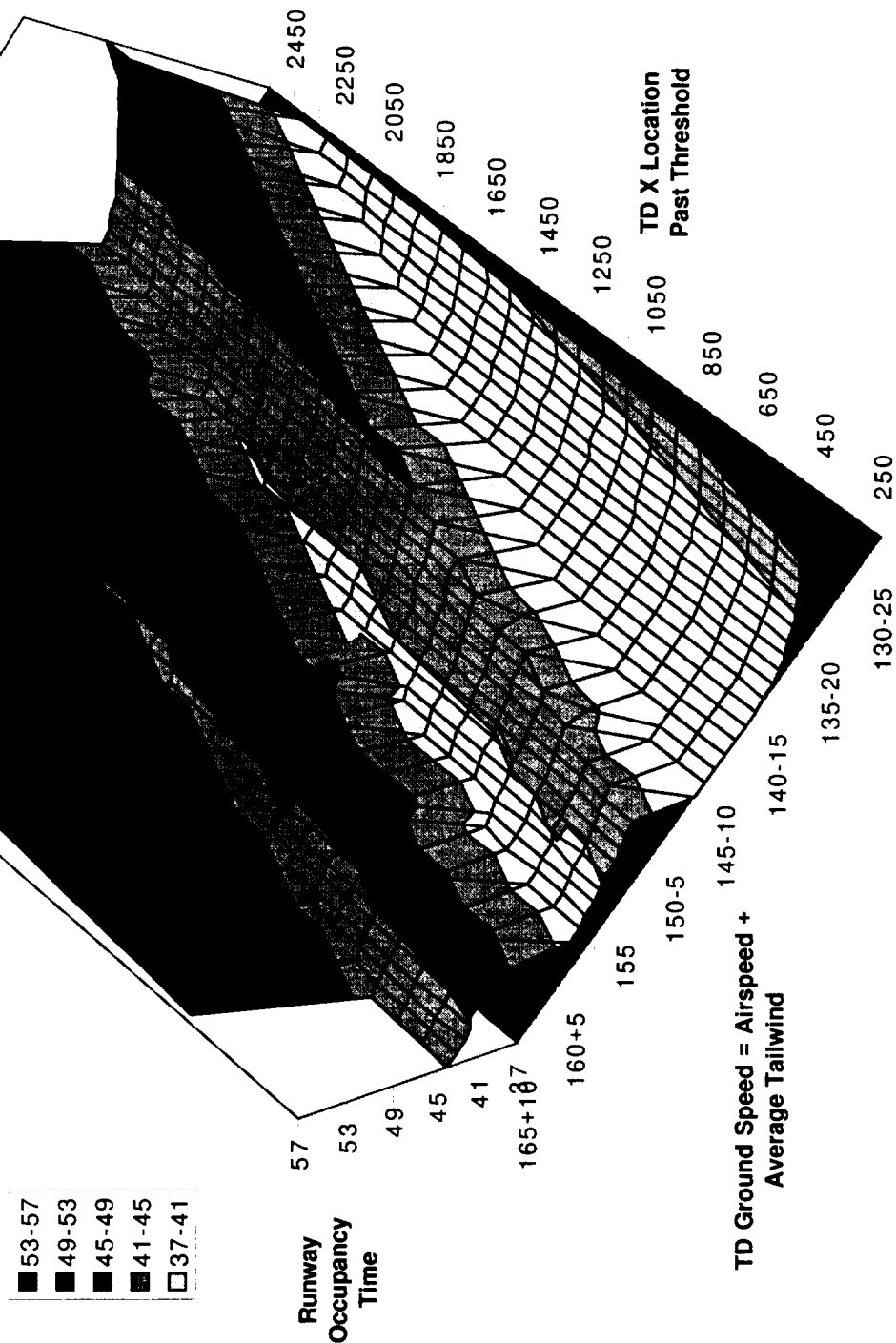
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

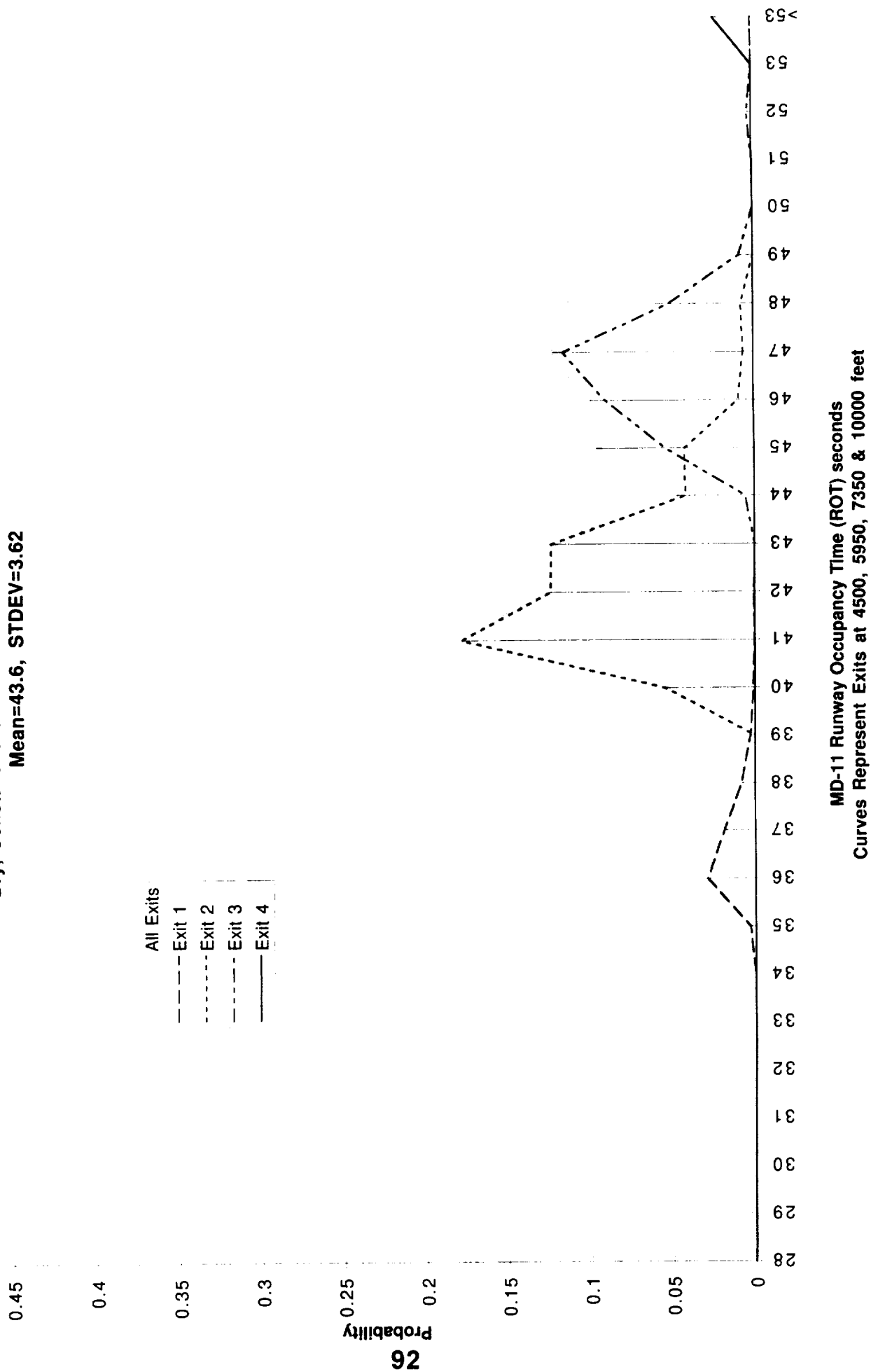
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits = 4500, 5950, 7350, 10000
 Constant Reverse Thrust/Roll-constant 6.5 Deceleration
 Stow Reverse Thrust and coast below 70 kt gd
 if coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
 Dry, Constant reverse thrust/roll-constant 6.5 decel
 Mean=43.6, STDEV=3.62



Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

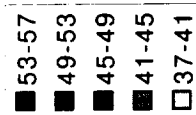
MD-81 ROTO Occupancy Time

Wet, Exits = 4500, 5950, 7350, 10000

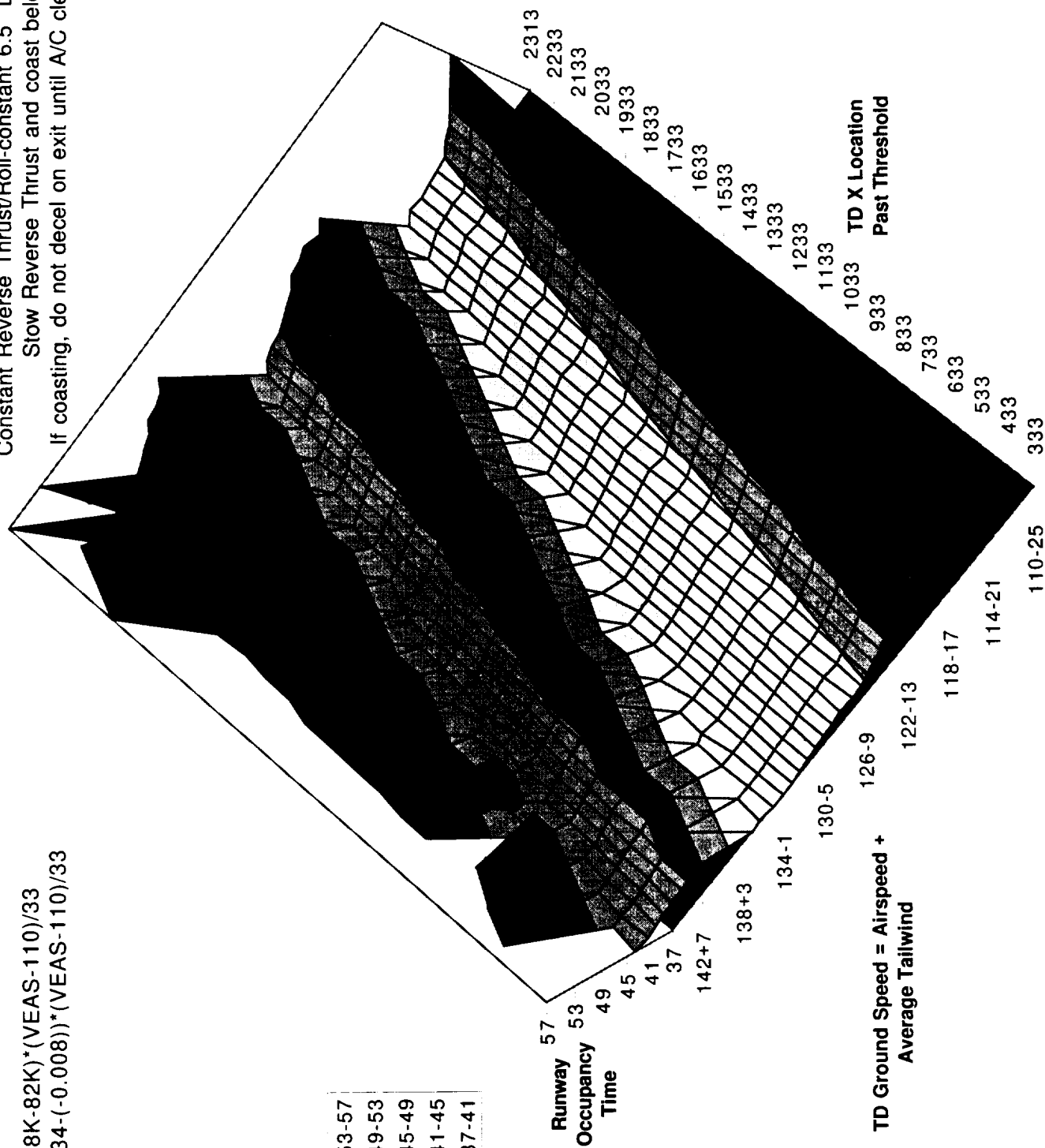
Constant Reverse Thrust/Roll-constant 6.5 Deceleration

Stow Reverse Thrust and coast below 70 kt gd

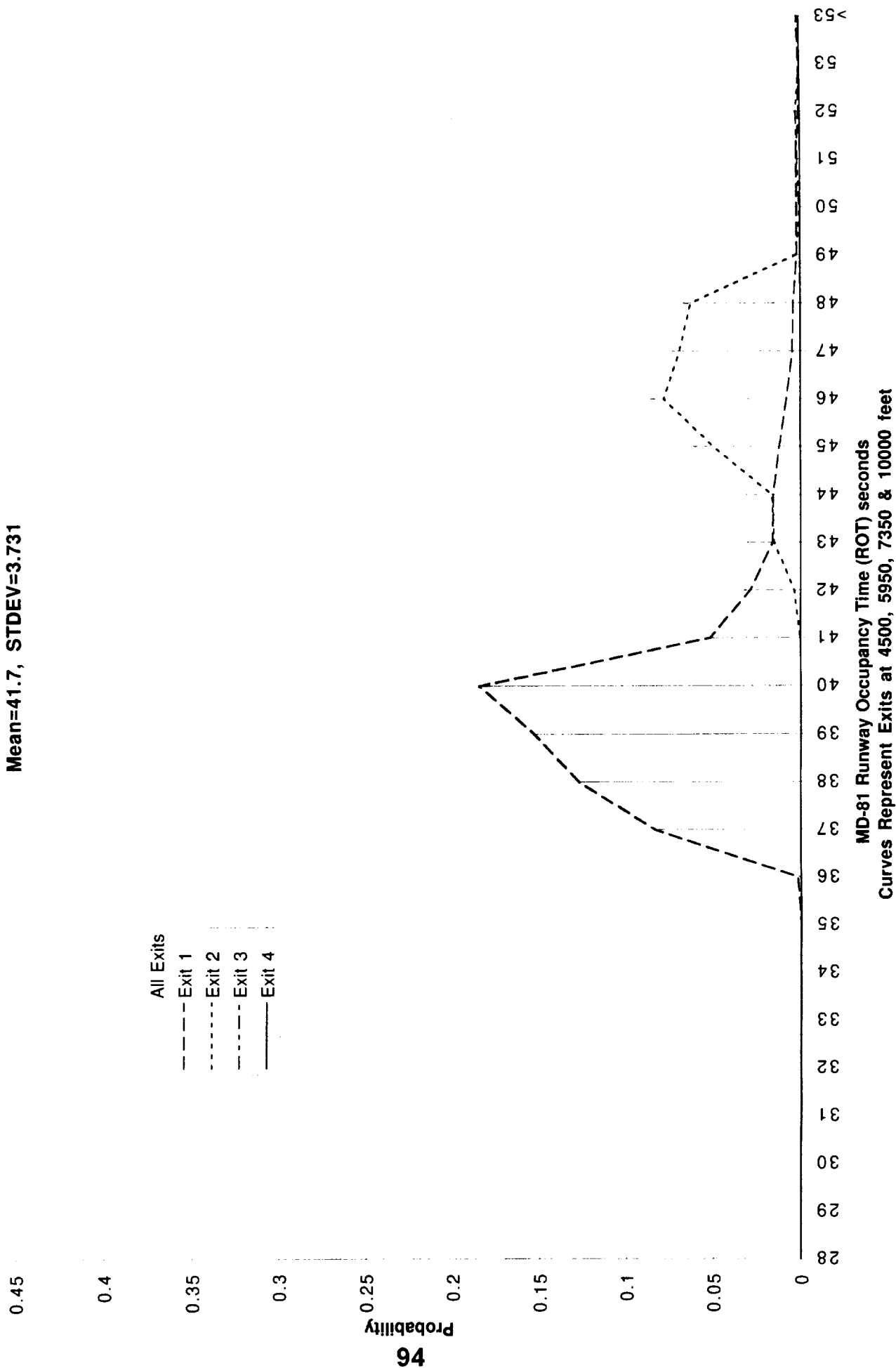
If coasting, do not decel on exit until A/C clears runway



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MD-81 ROTO ROT Probability Distribution
Wet, Constant reverse thrust/roll-constant 6.5 decel
Mean=41.7, STDEV=3.731



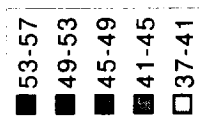
Predict exit prior to TD

MD-81 ROTO Occupancy Time

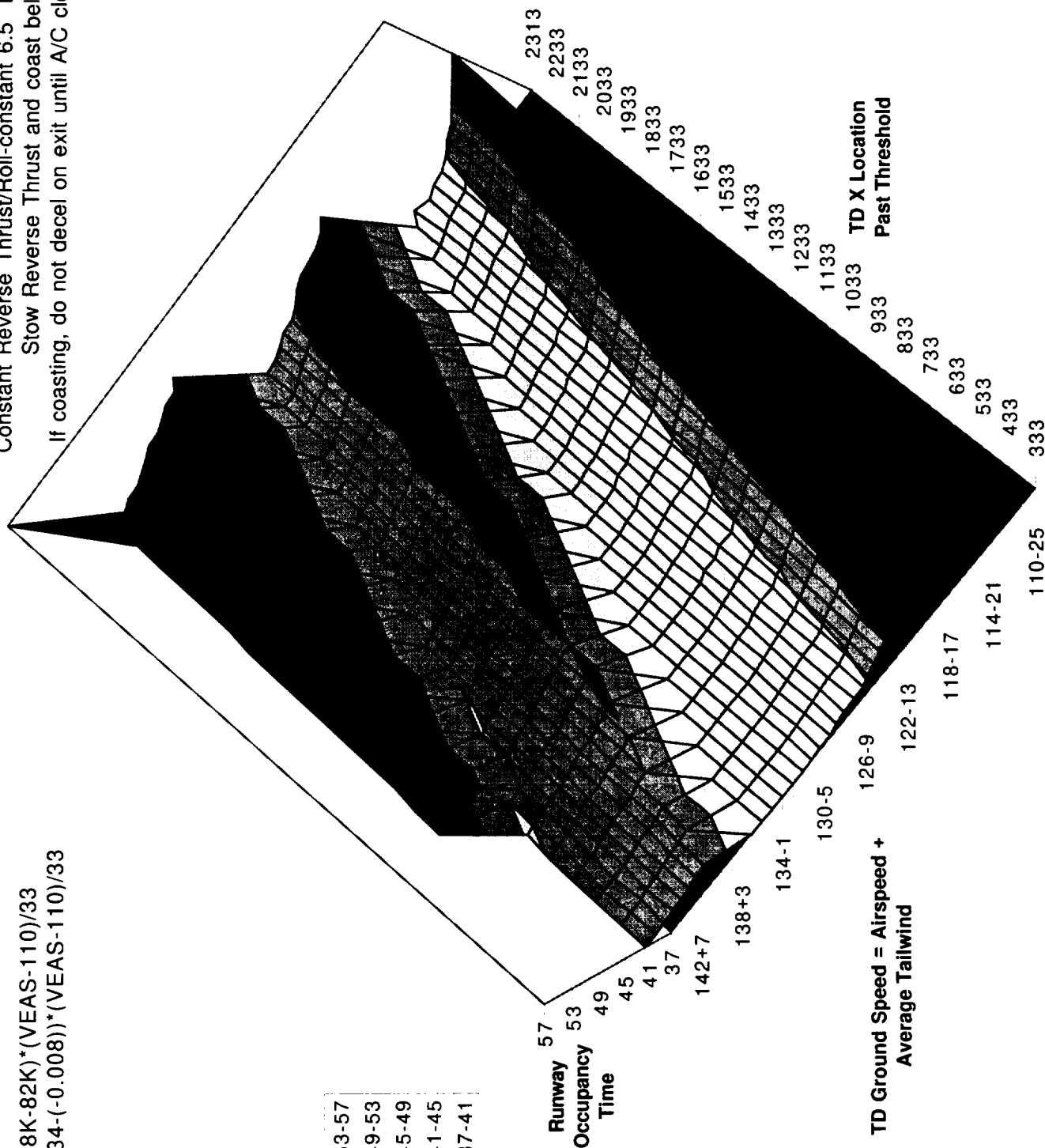
Dry, Exits=4500, 5950, 7350, 10000
 Constant Reverse Thrust/Roll-constant 6.5 Deceleration
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

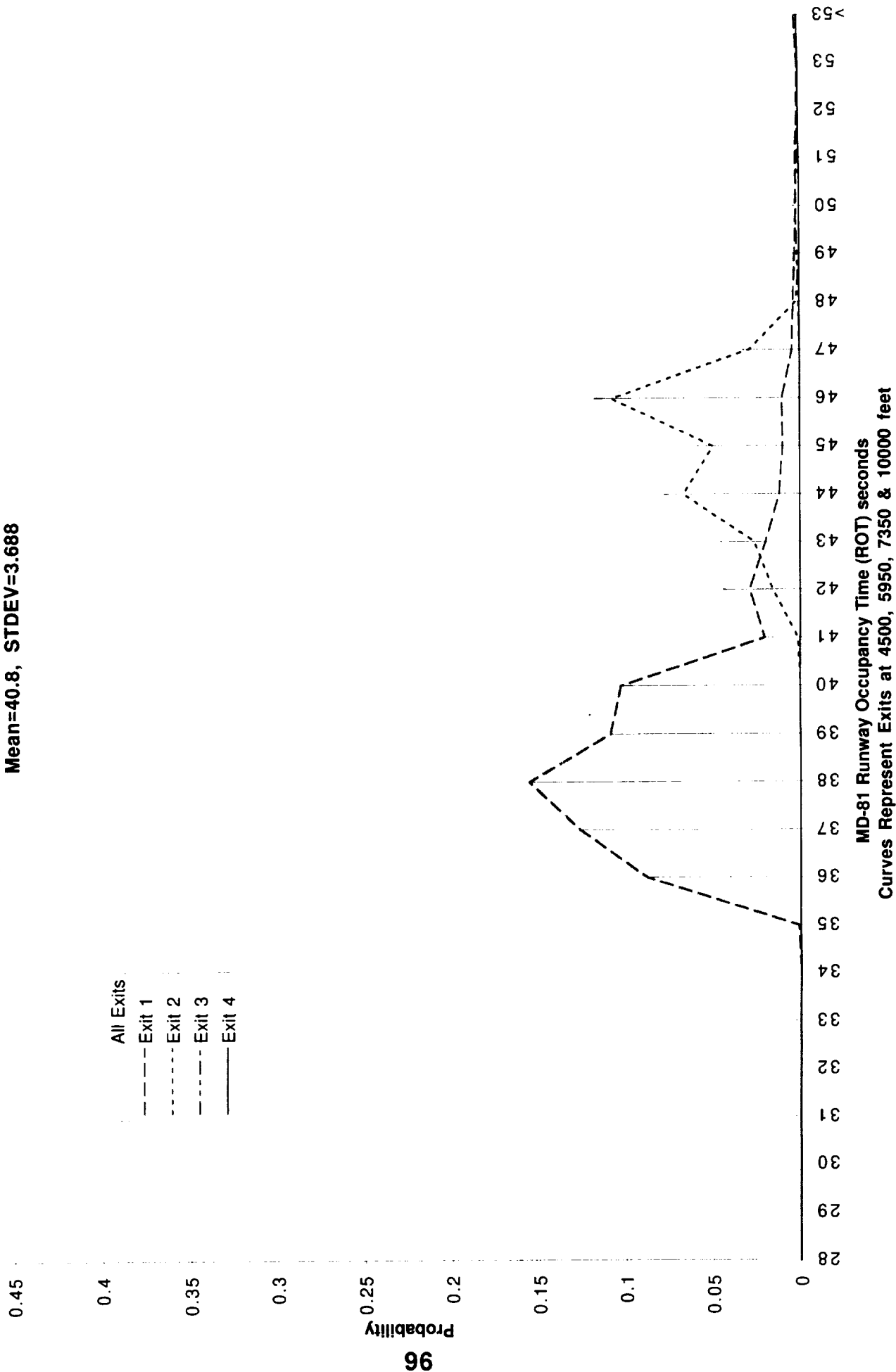
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$



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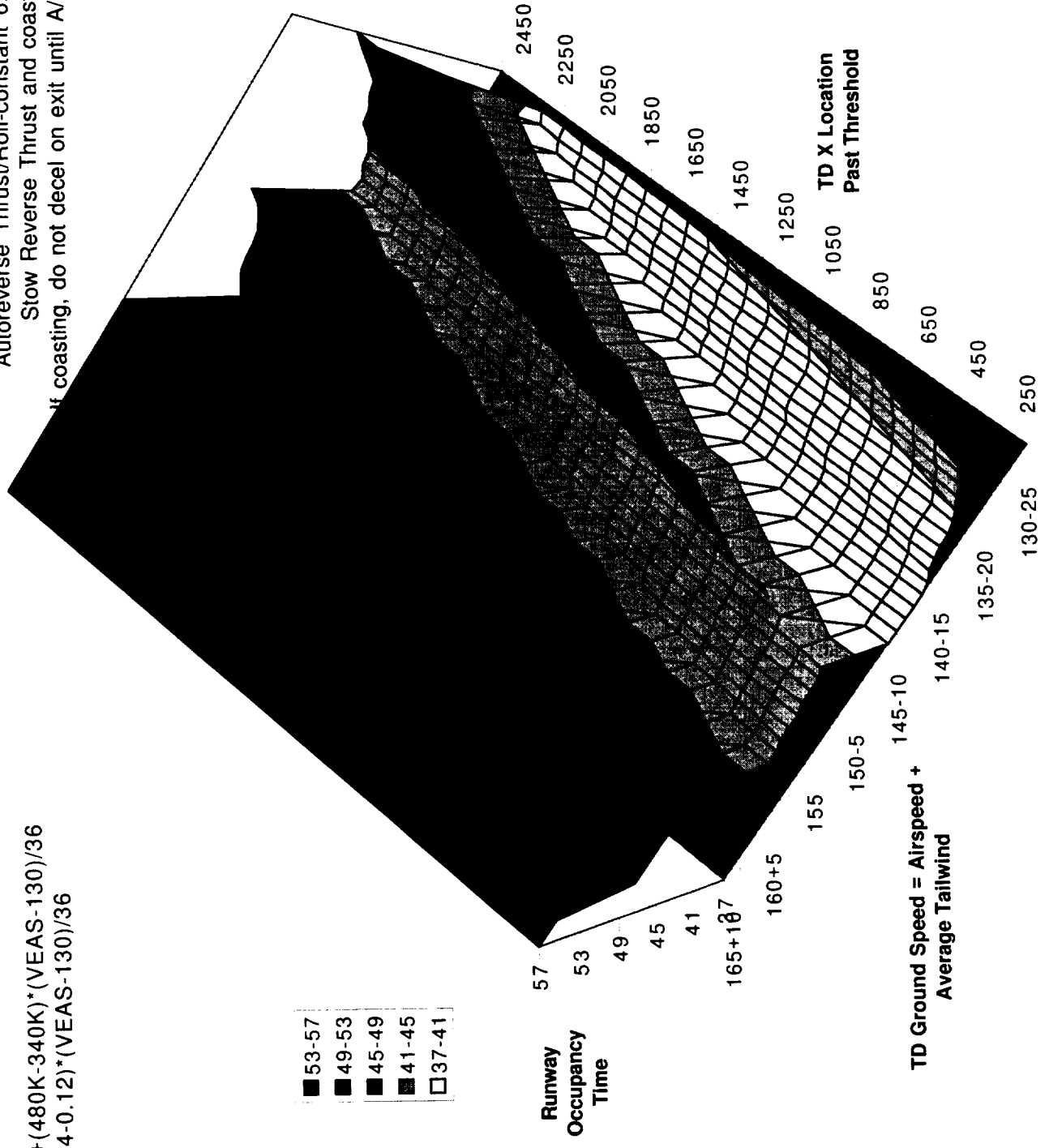
MD-81 ROTO ROT Probability Distribution
 Dry, Constant reverse thrust/roll-constant 6.5 decel
 Mean=40.8, STDEV=3.688



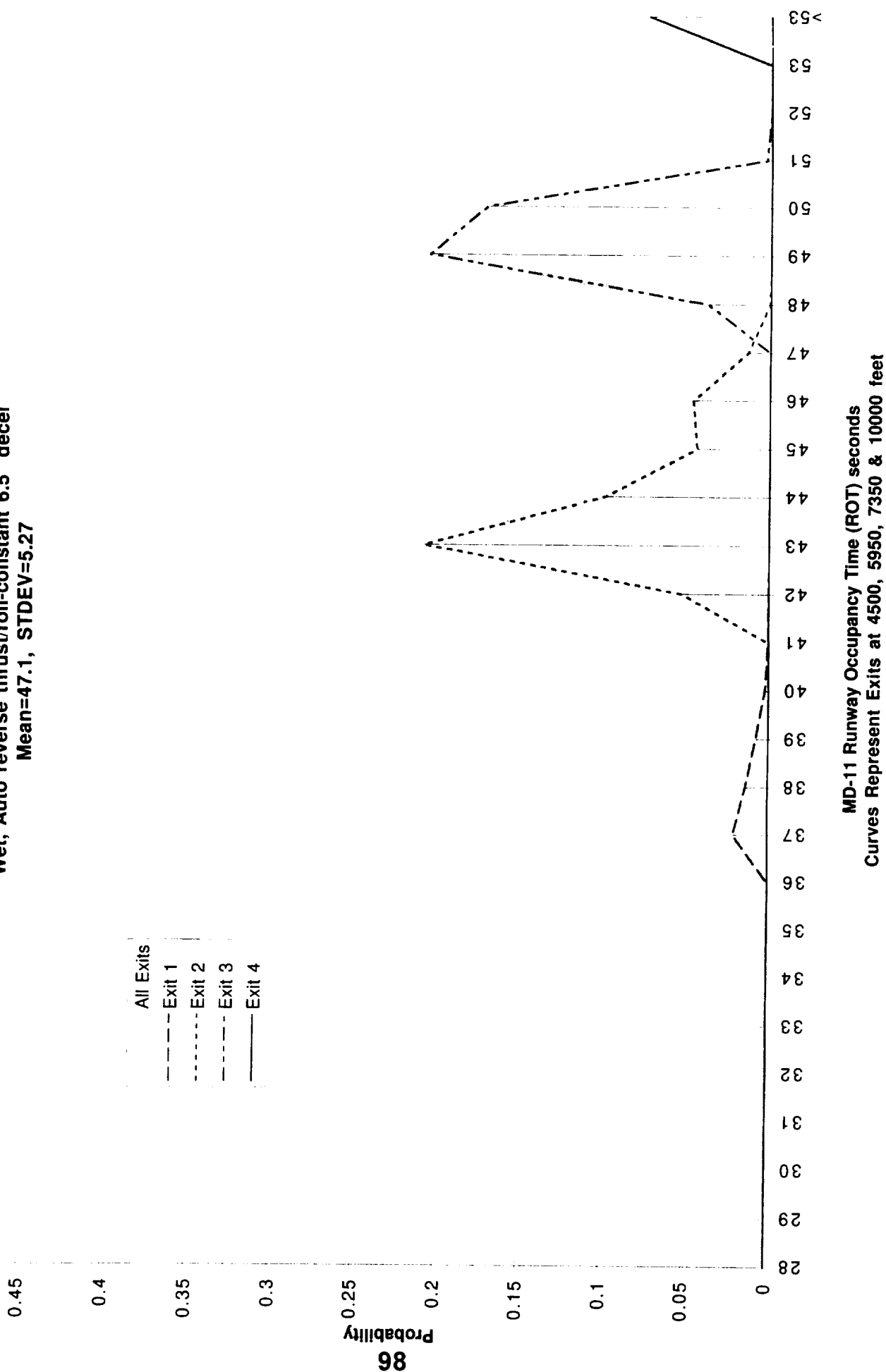
Predict exit prior to TD
 $Weight = 340K + (480K - 340K) * (VEAS - 130) / 36$
 $CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$

MD-11 ROTO Occupancy Time

Wet, Exits = 4500, 5950, 7350, 10000
 Autoreverse Thrust/Roll-constant 6.5 Deceleration
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/roll-constant 6.5 decel
Mean=47.1, STDEV=5.27



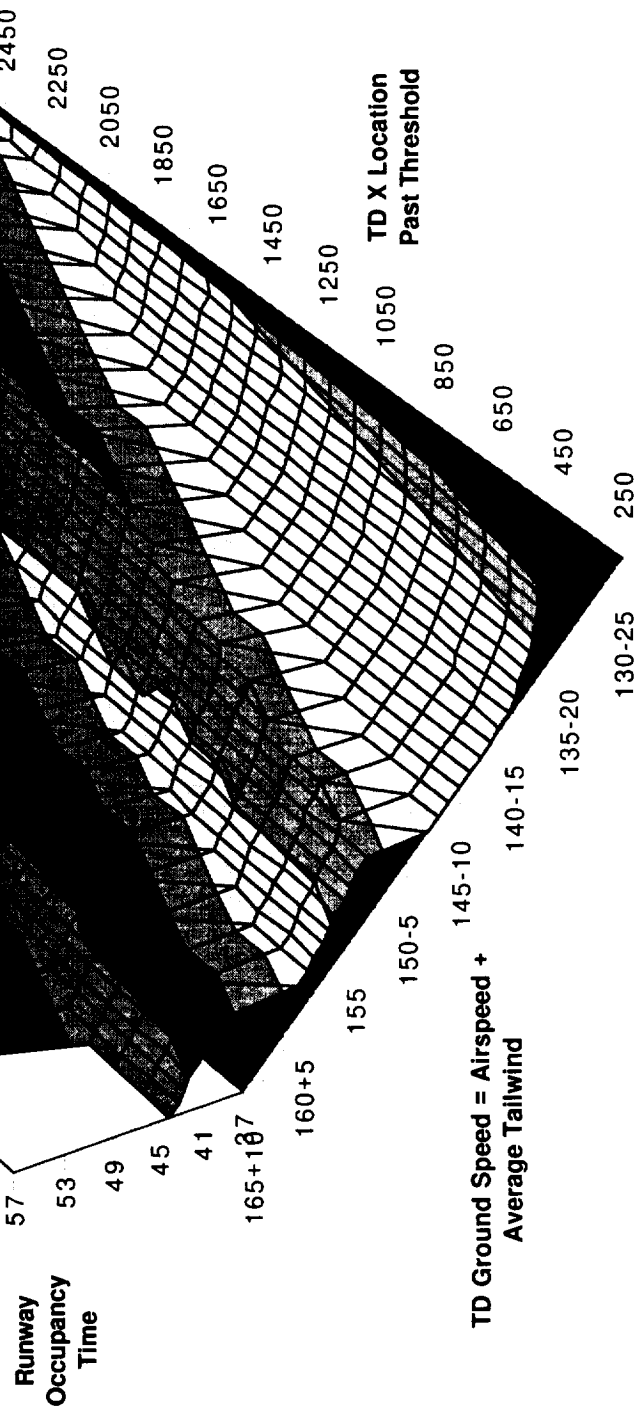
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

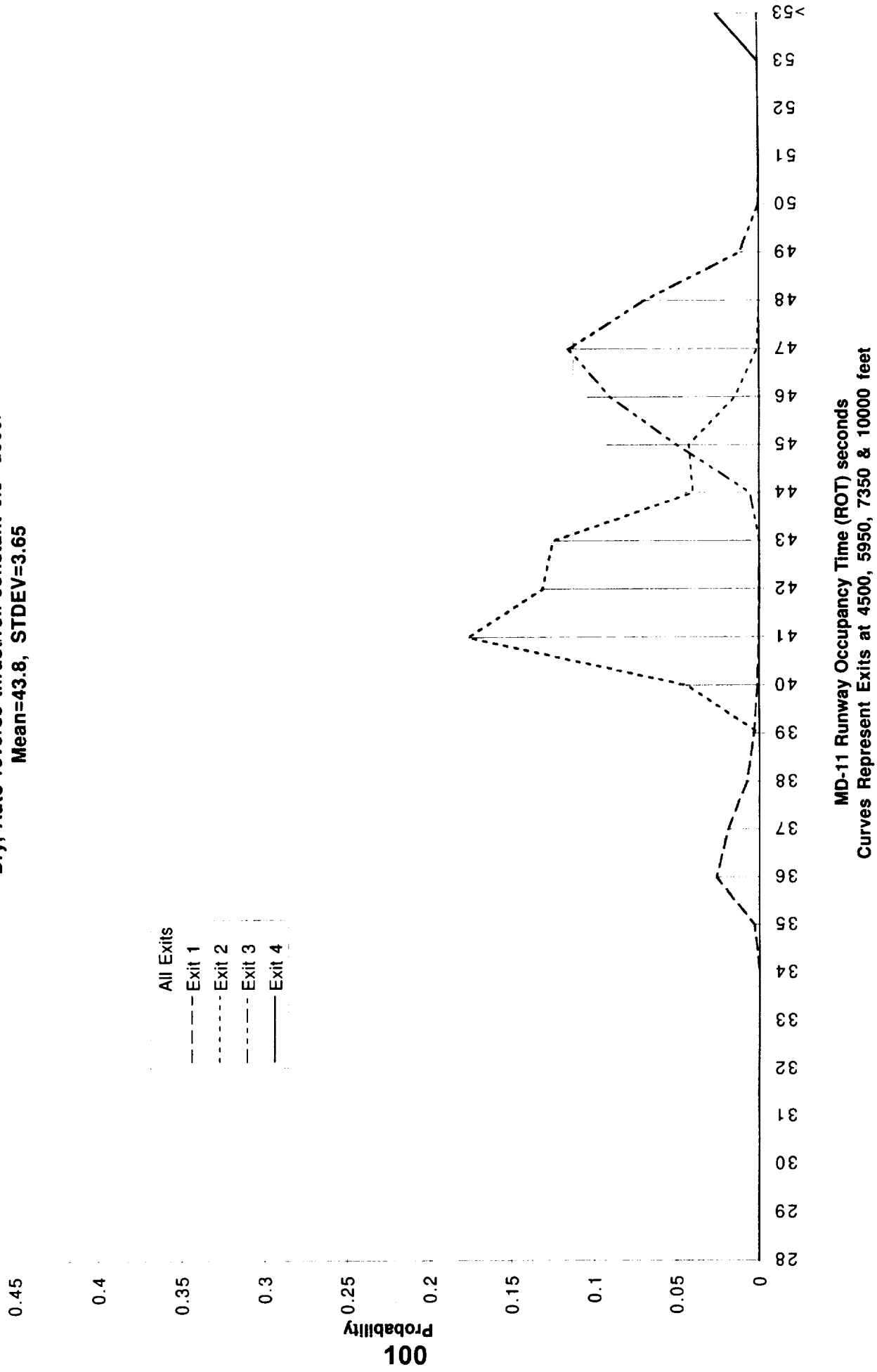
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Roll-constant 6.5 Deceleration
Stow Reverse Thrust and coast below 70 kt gd
If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/roll-constant 6.5 decel
 Mean=43.8, STDEV=3.65



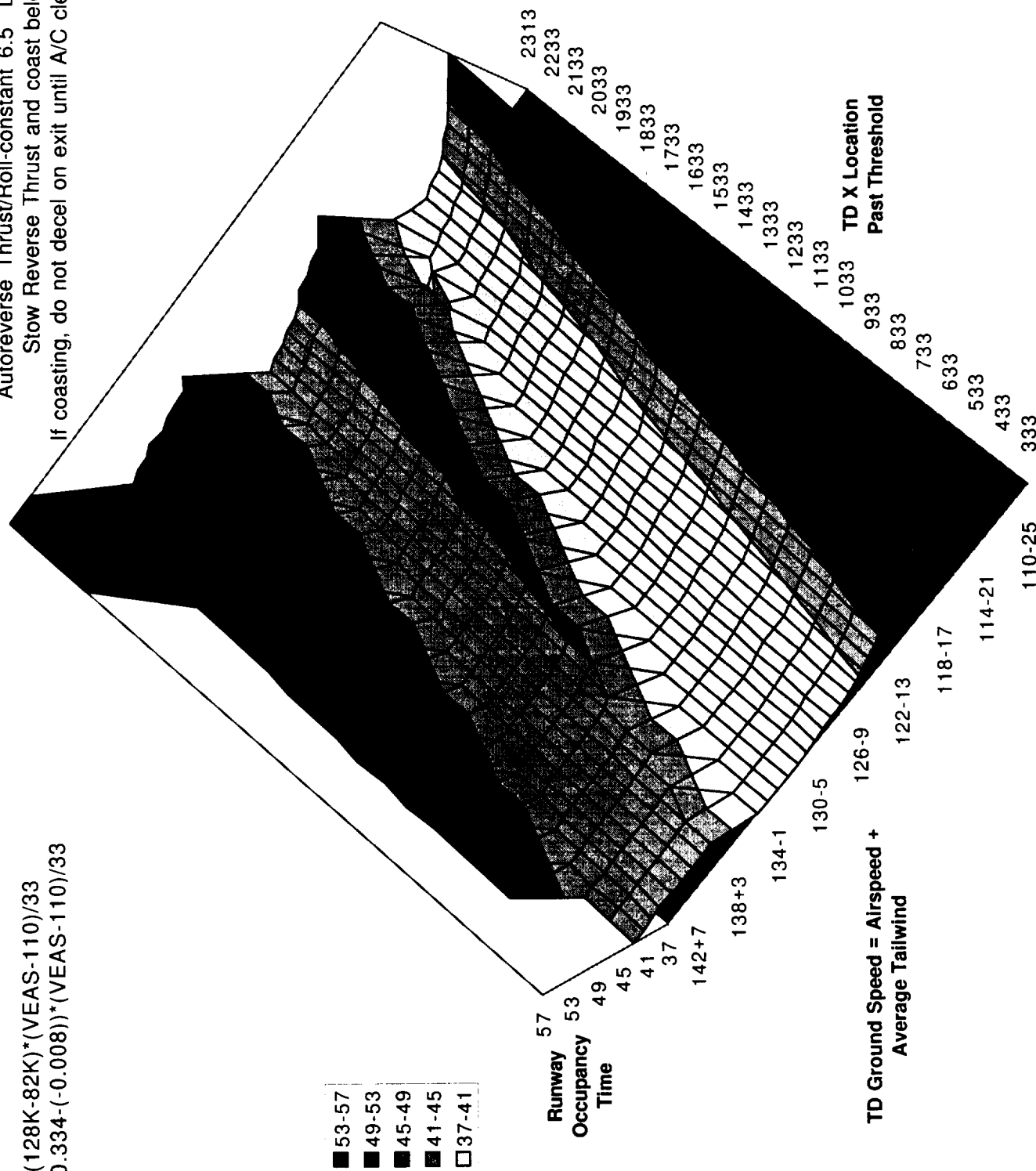
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

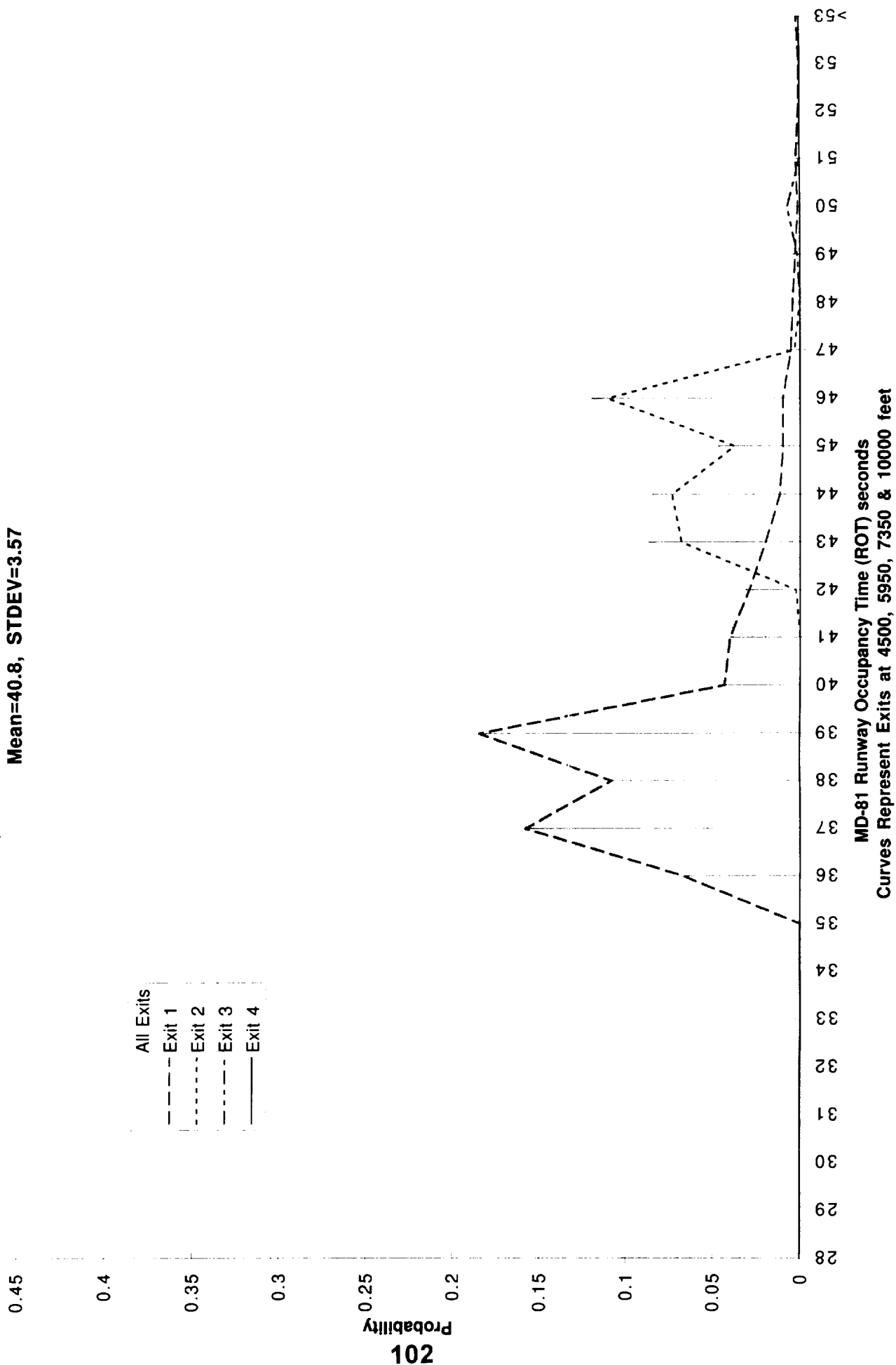
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
 Autoreverse Thrust/Roll-constant 6.5 Deceleration
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/roll-constant 6.5 decel
Mean=40.8, STDEV=3.57

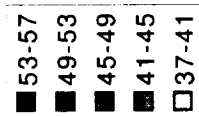


Predict exit prior to TD

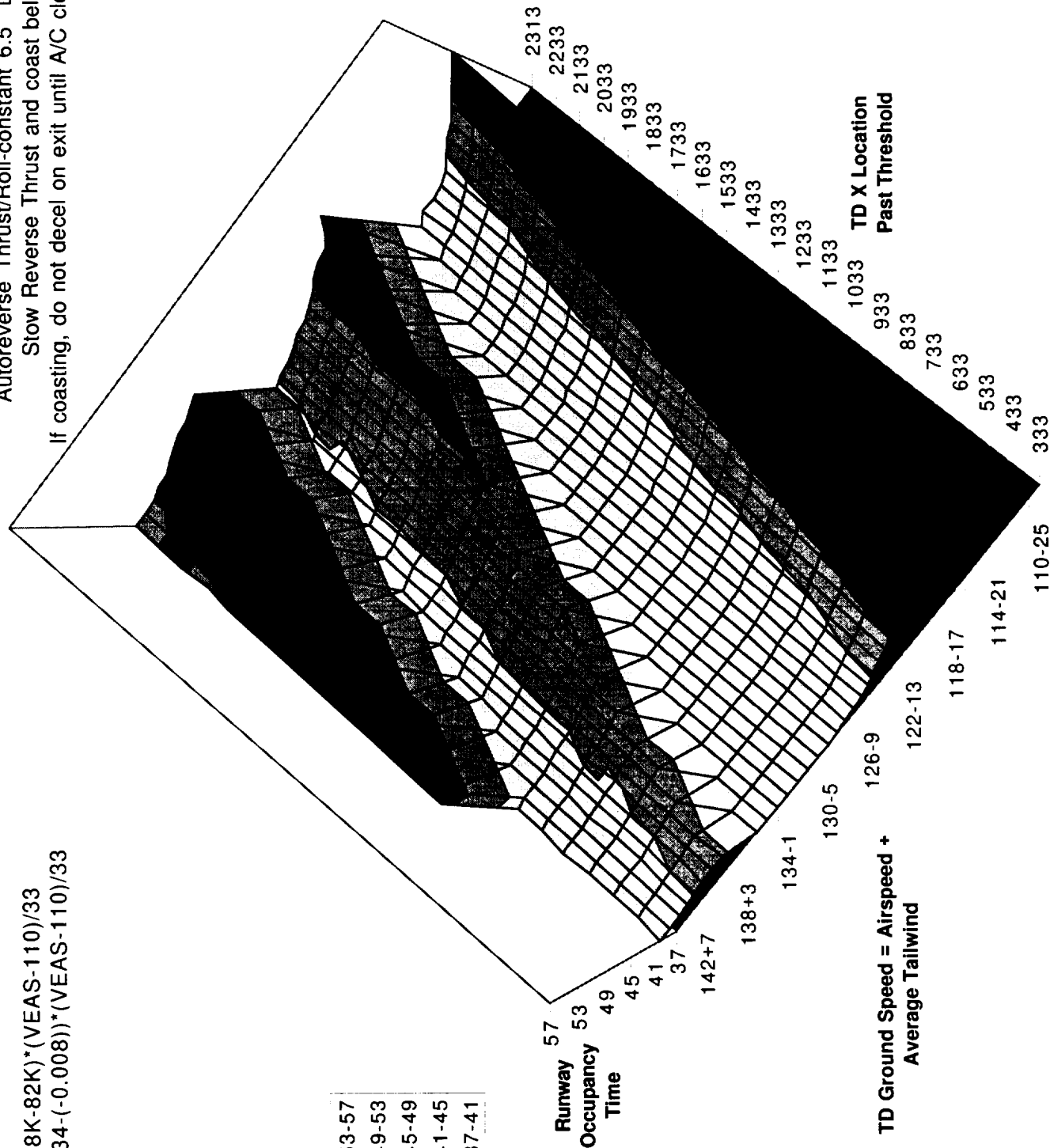
$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

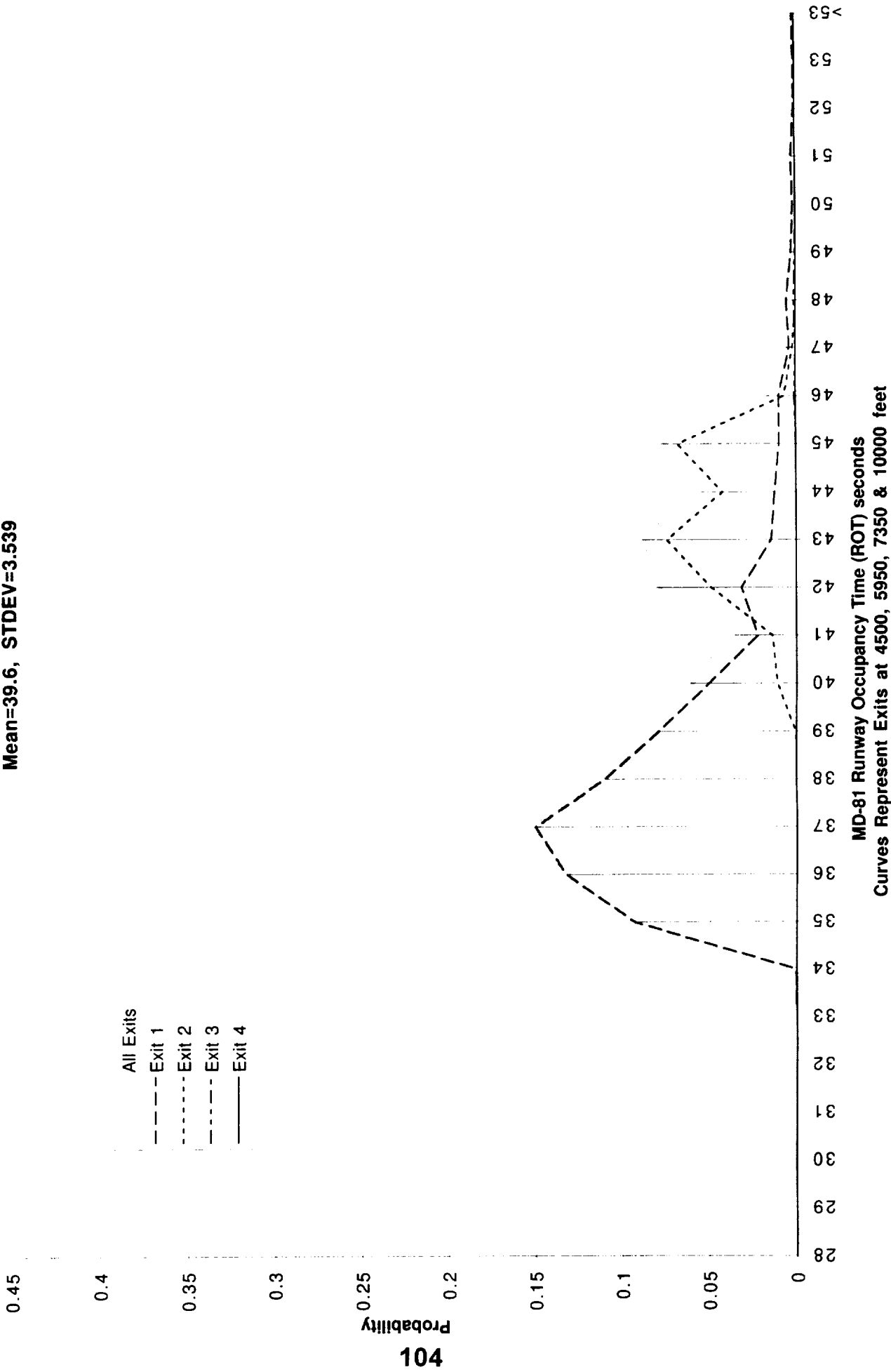
Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Roll-constant 6.5 Deceleration
Stow Reverse Thrust and coast below 70 kt gd
If coasting, do not decel on exit until A/C clears runway



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MD-81 ROTO ROT Probability Distribution
Dry, Auto reverse thrust/roll-constant 6.5 decel
Mean=39.6, STDEV=3.539



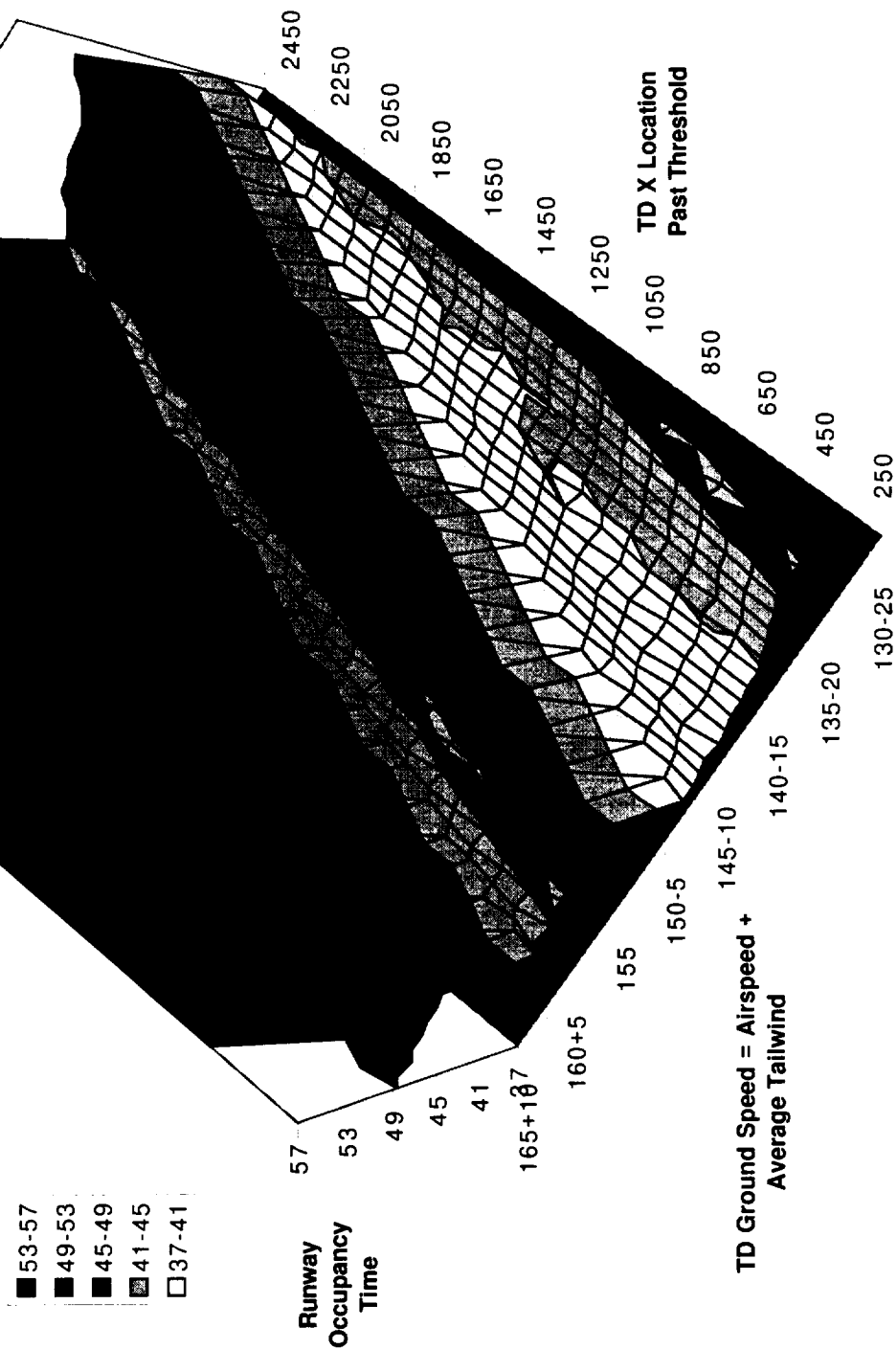
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

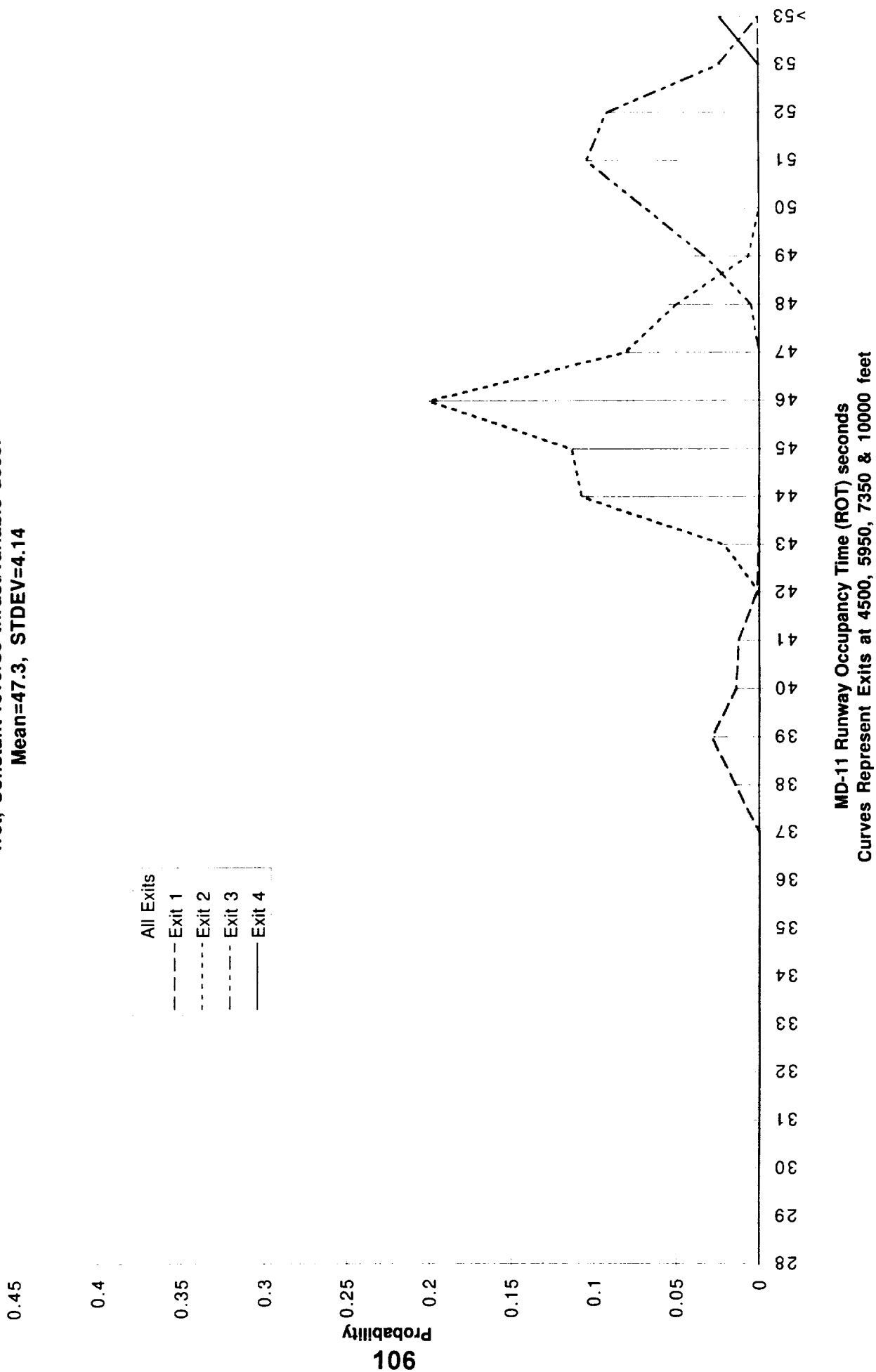
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Constant Reverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Constant reverse thrust/variable decel
Mean=47.3, STDEV=4.14



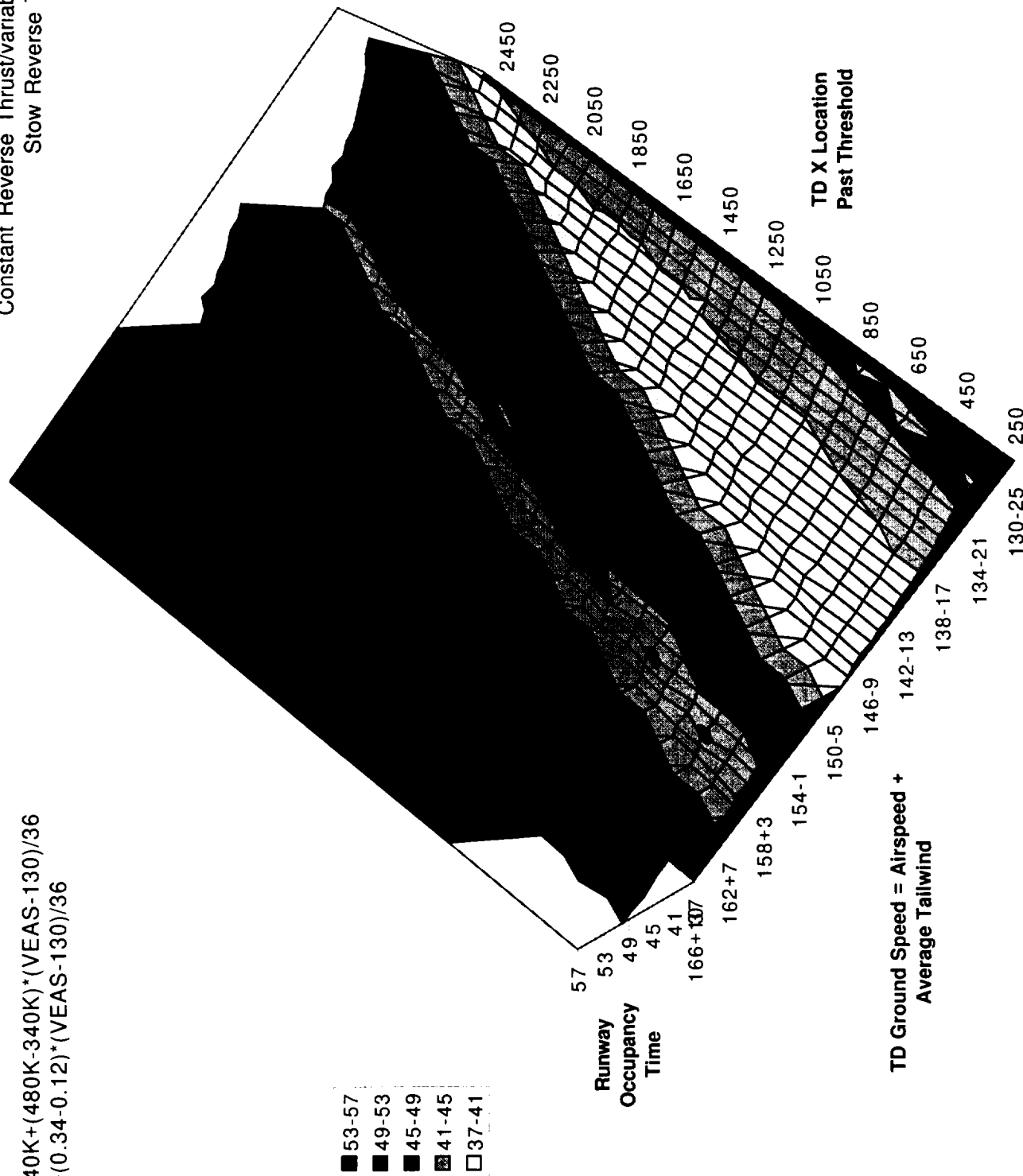
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

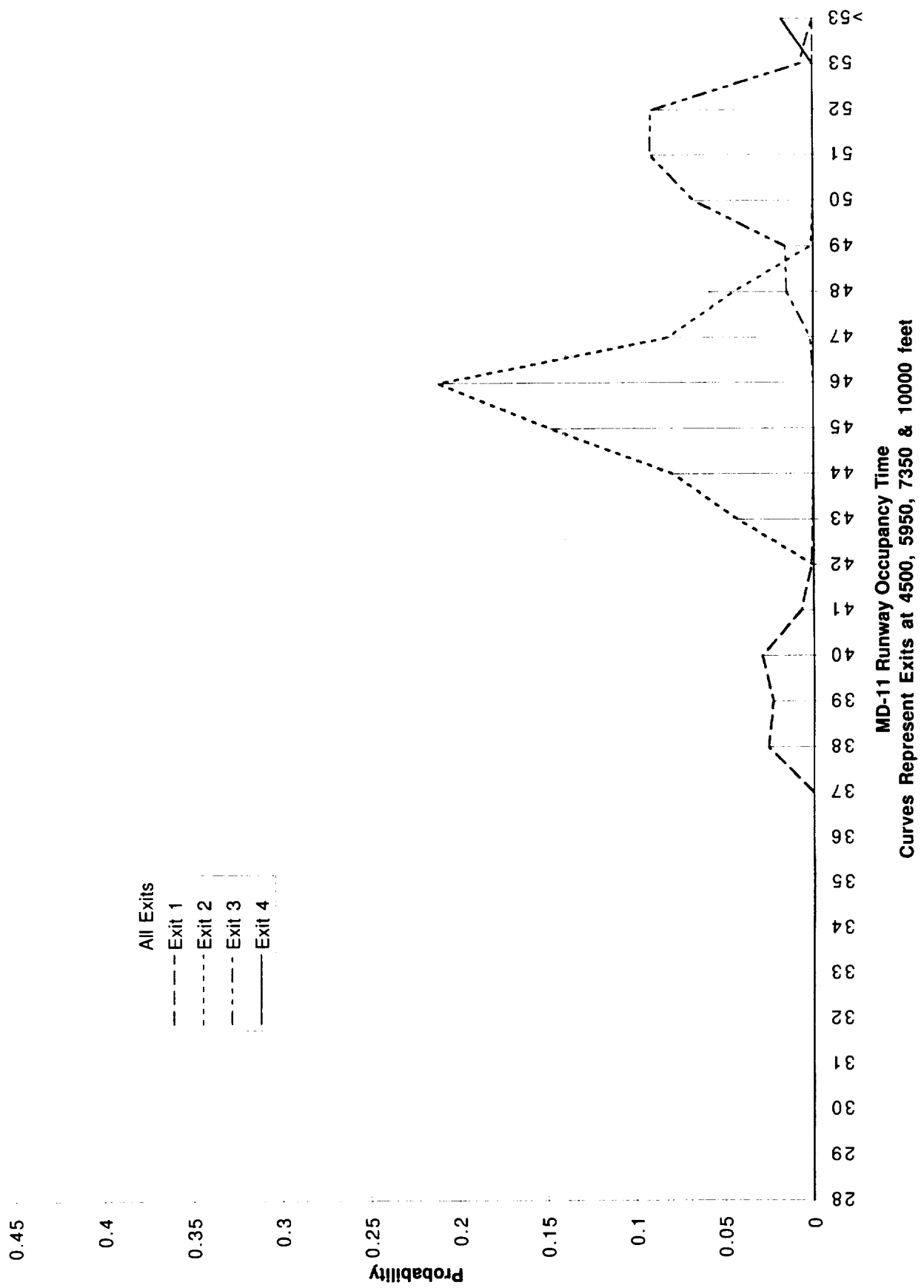
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Constant Reverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt/gd



MD-11 ROTO ROT Probability Distribution
 Dry, Constant reverse thrust/variable decel
 Mean=46.8, STDEV=4.026



Predict exit prior to TD

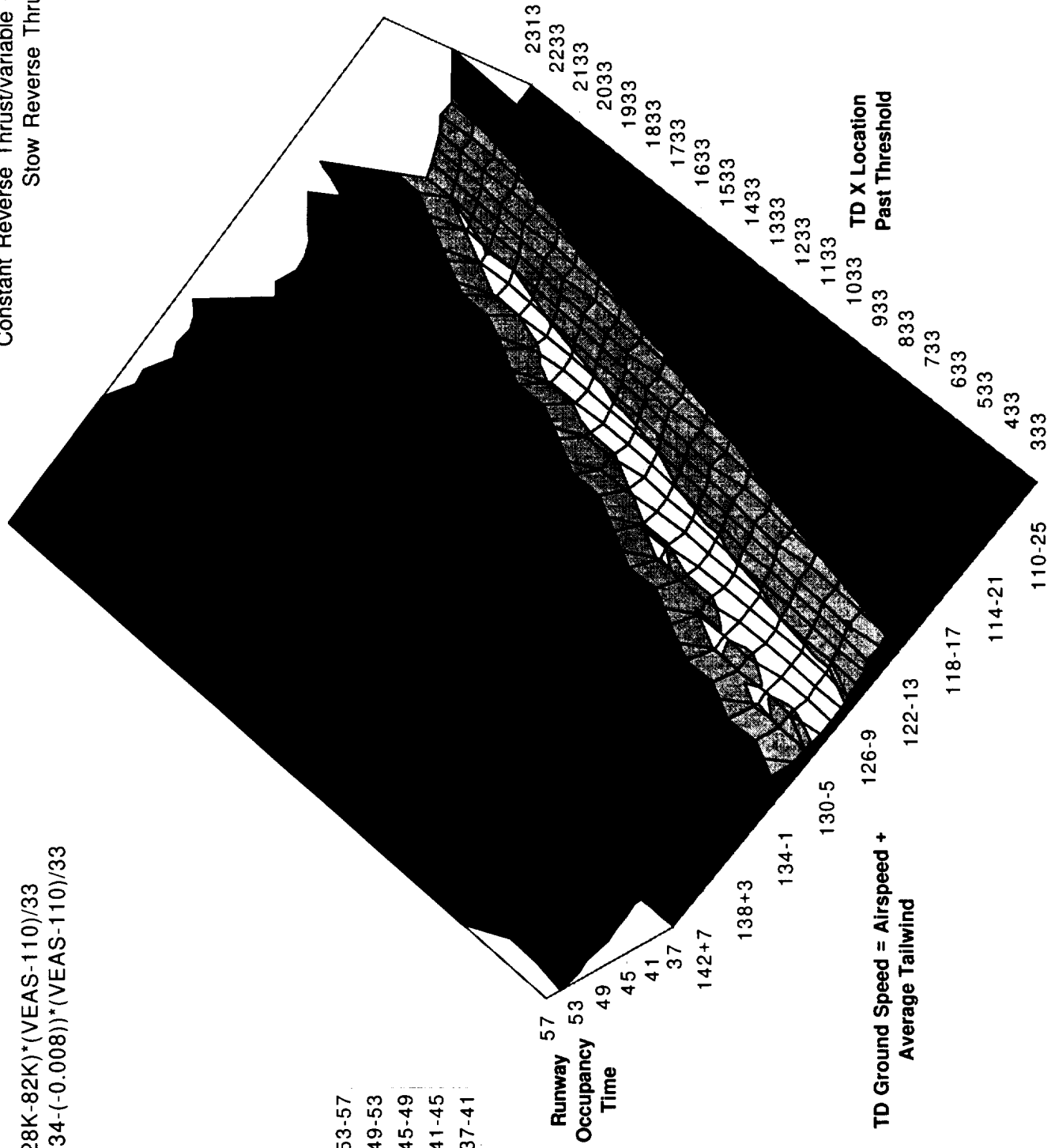
$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

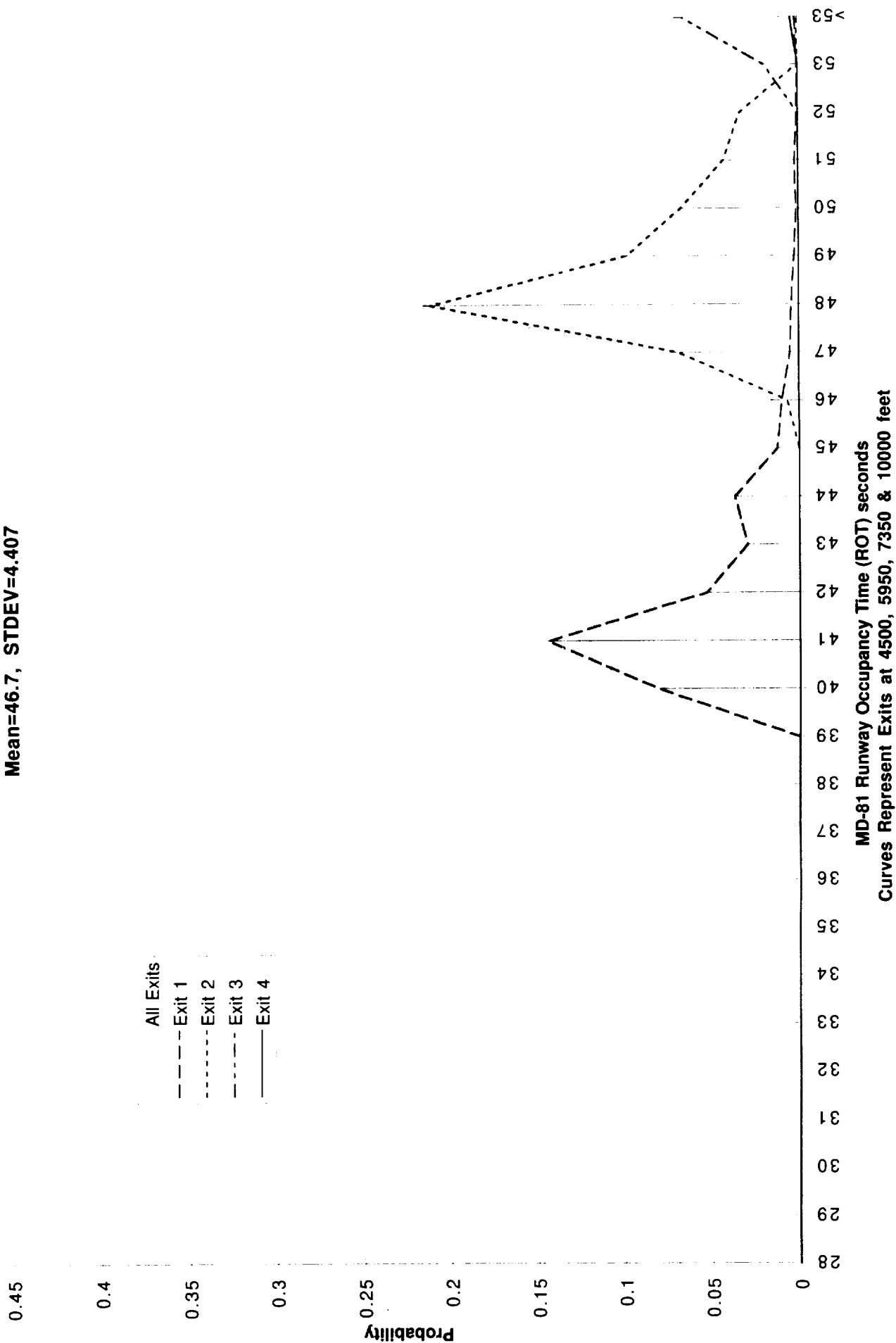
MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Constant Reverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-81 ROTO ROT Probability Distribution
Wet, Constant reverse thrust/variable decel
Mean=46.7, STDEV=4.407



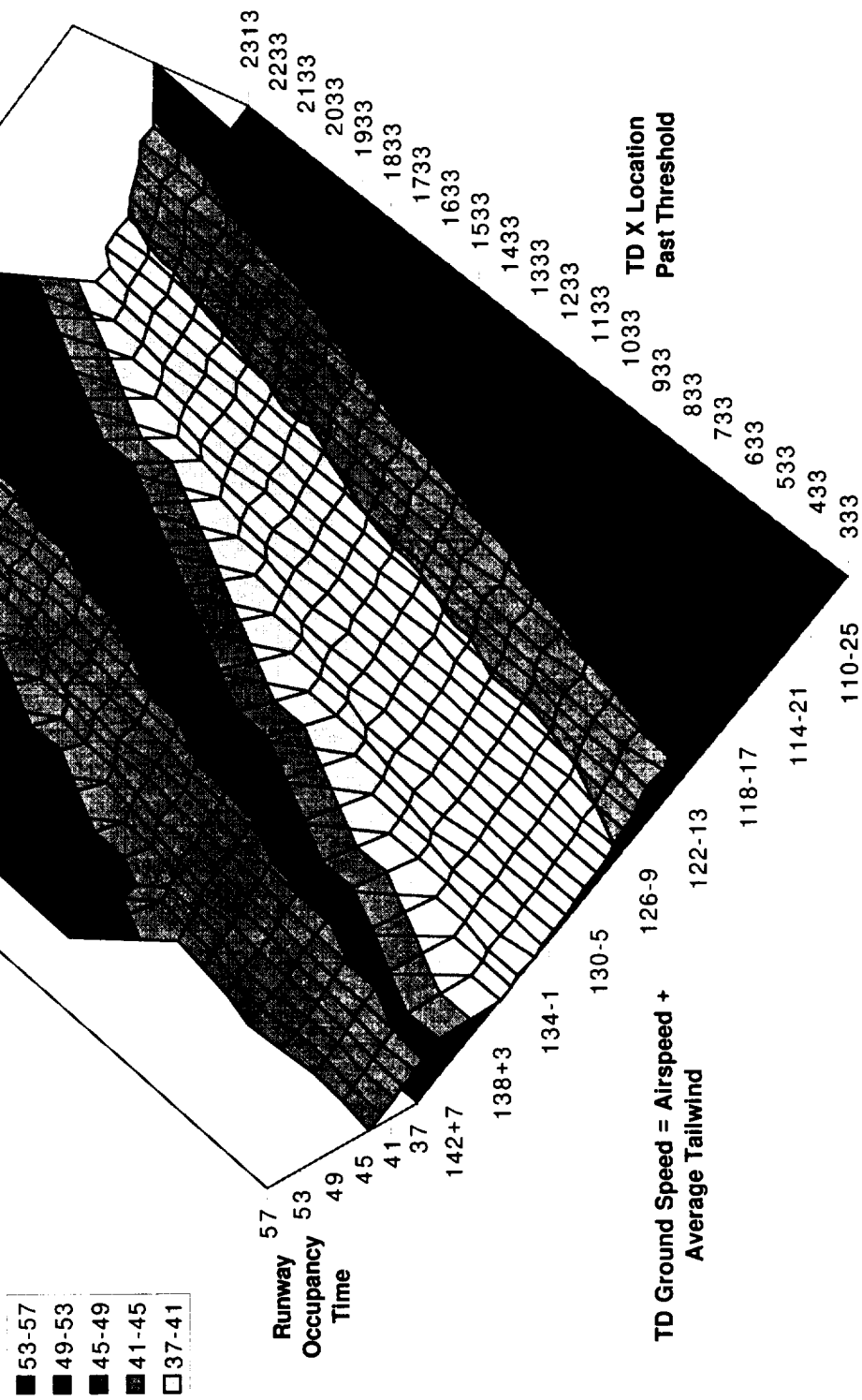
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

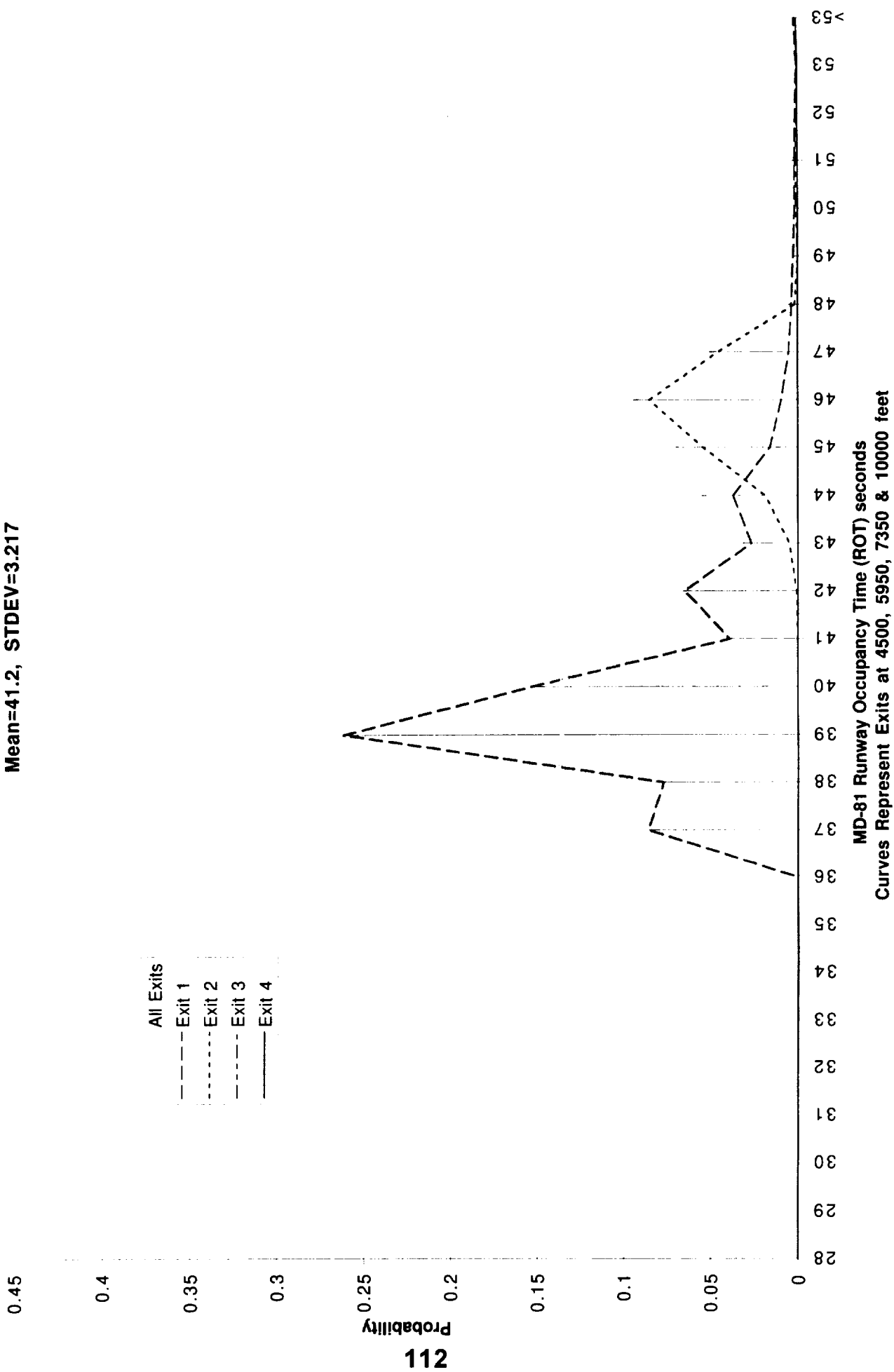
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Constant Reverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
 Dry, Constant reverse thrust/variable decel
 Mean=41.2, STDEV=3.217



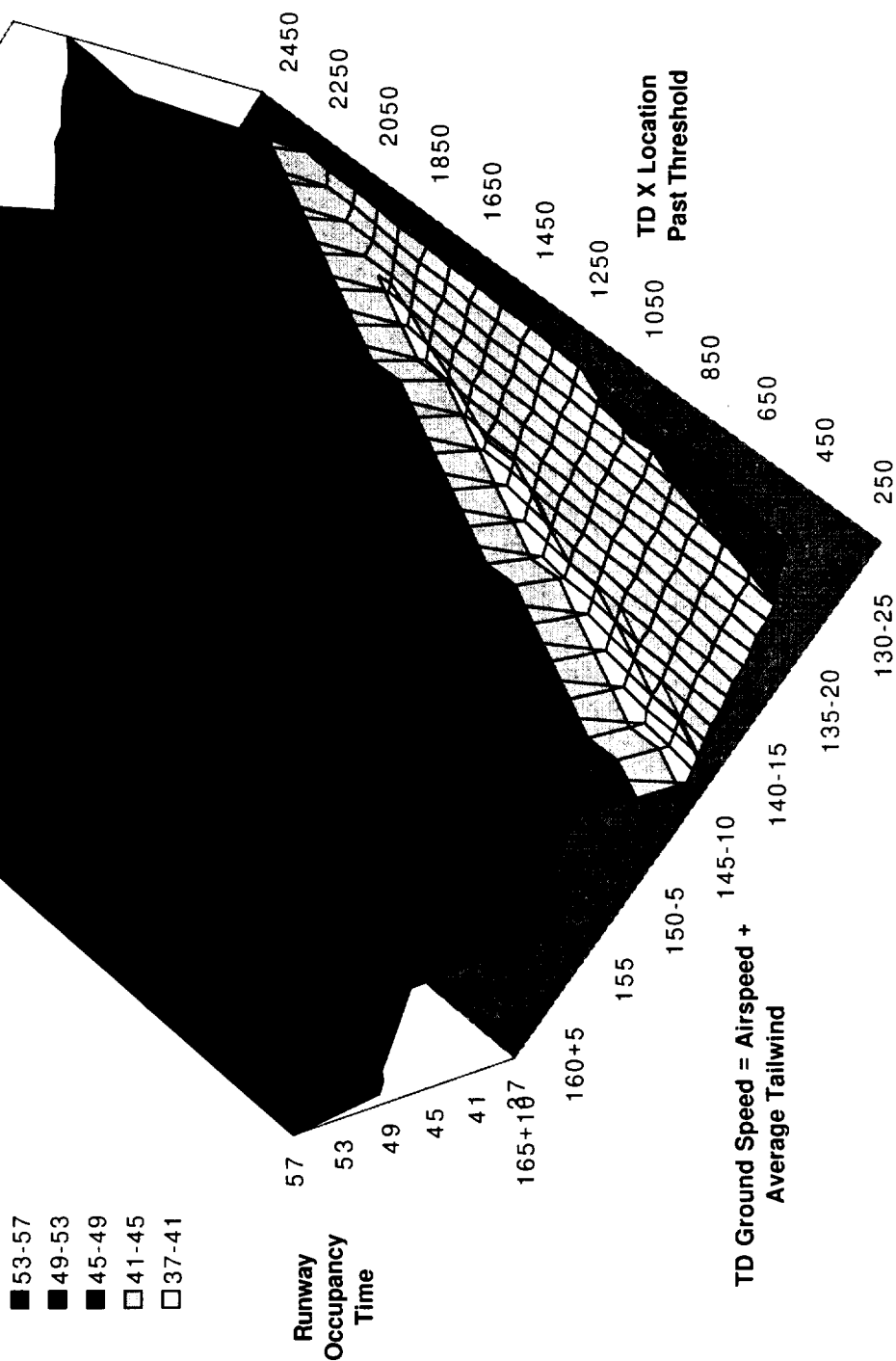
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

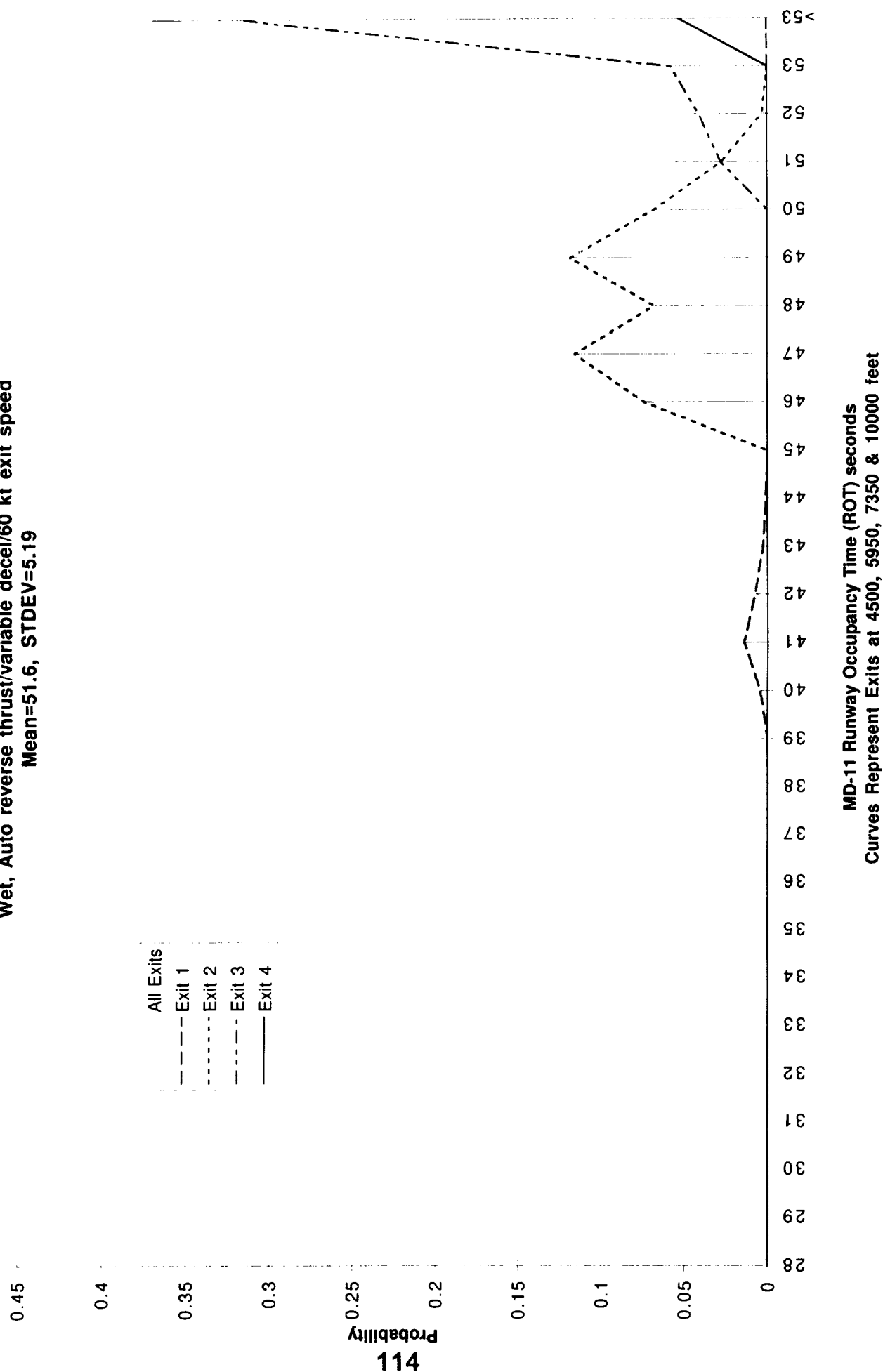
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=60 kt gd
60 knot high speed exit



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/60 kt exit speed
Mean=51.6, STDEV=5.19



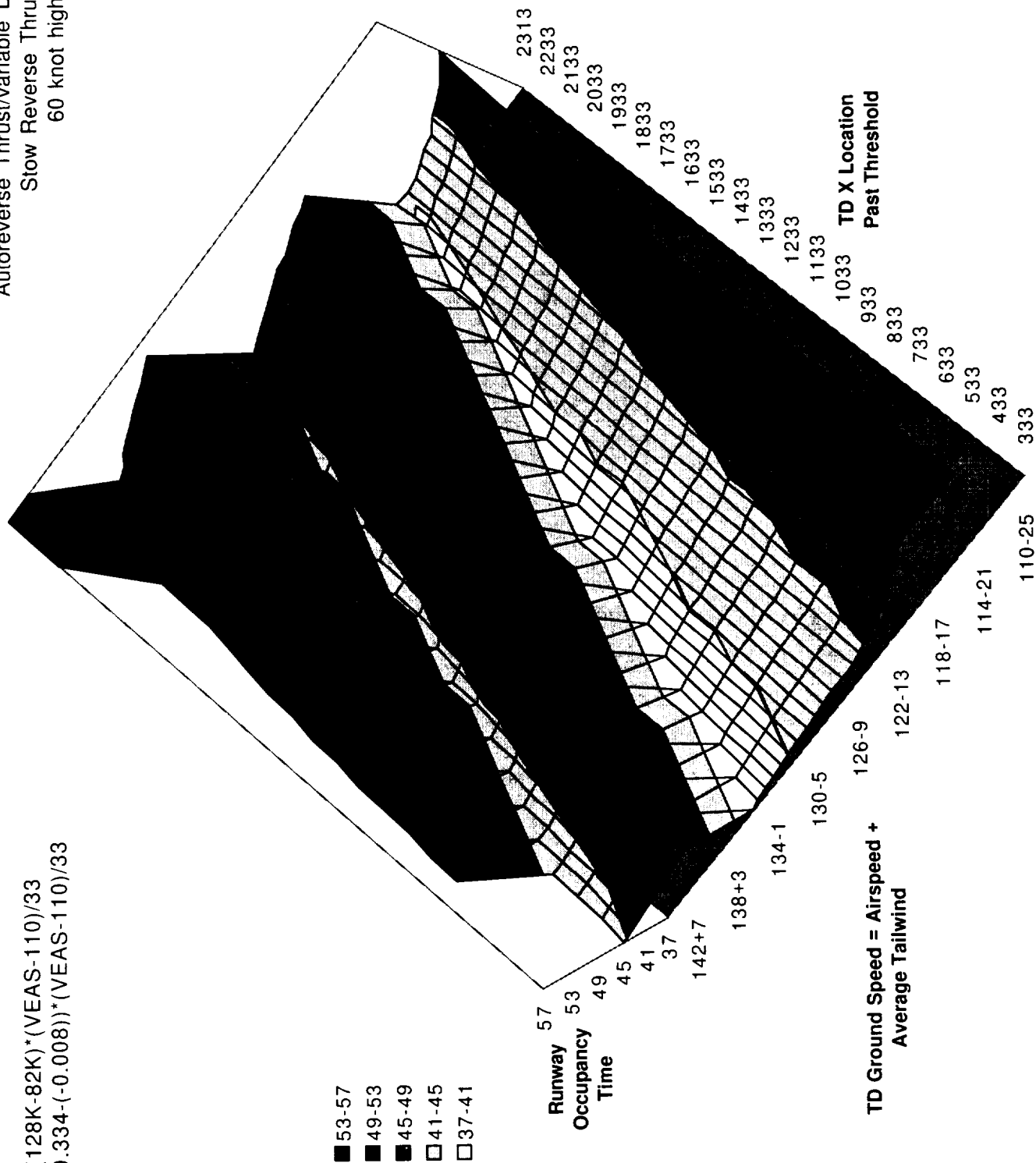
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

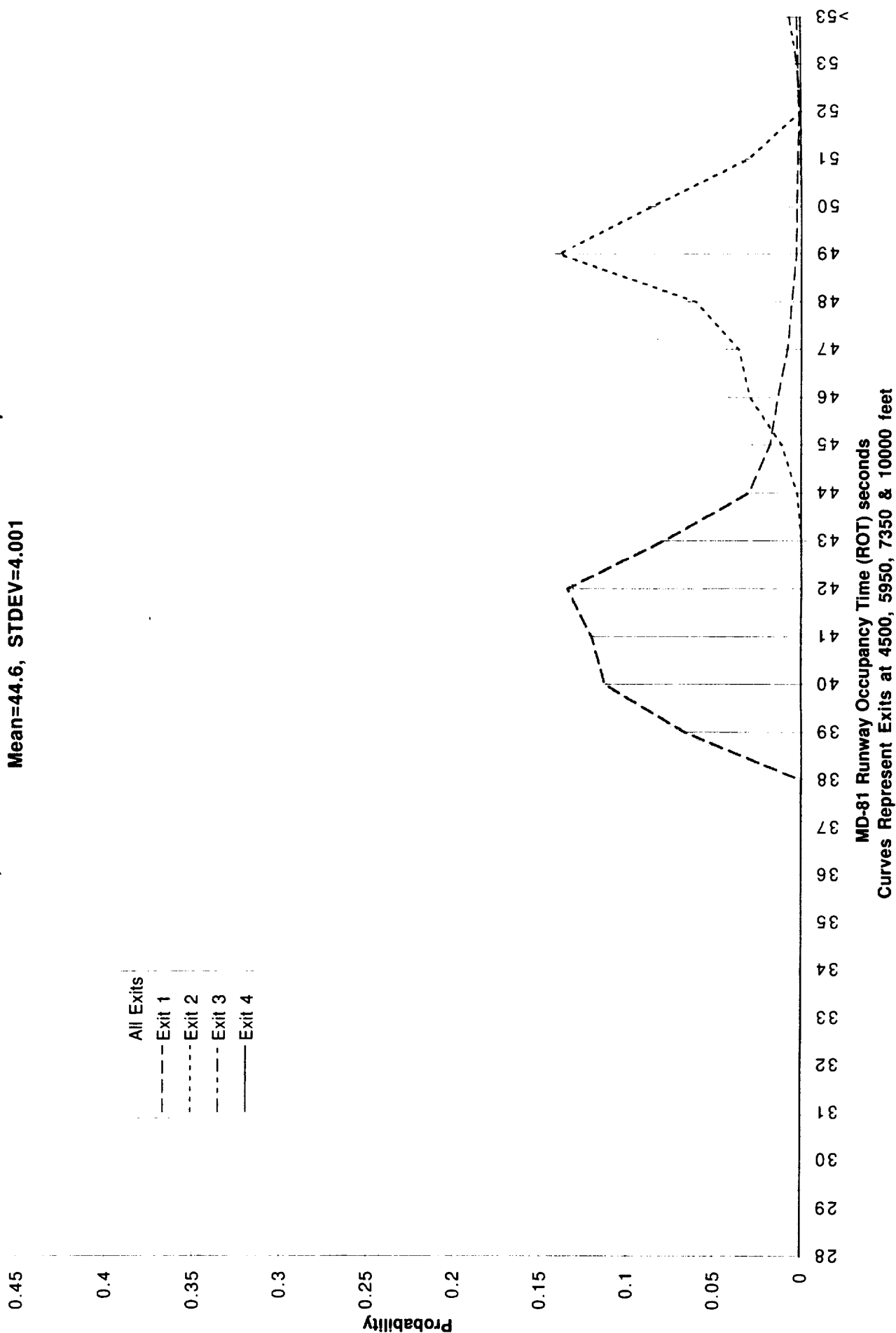
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=60 kt gd
60 knot high speed exit



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/60 kt exit speed
Mean=44.6, STDEV=4.001



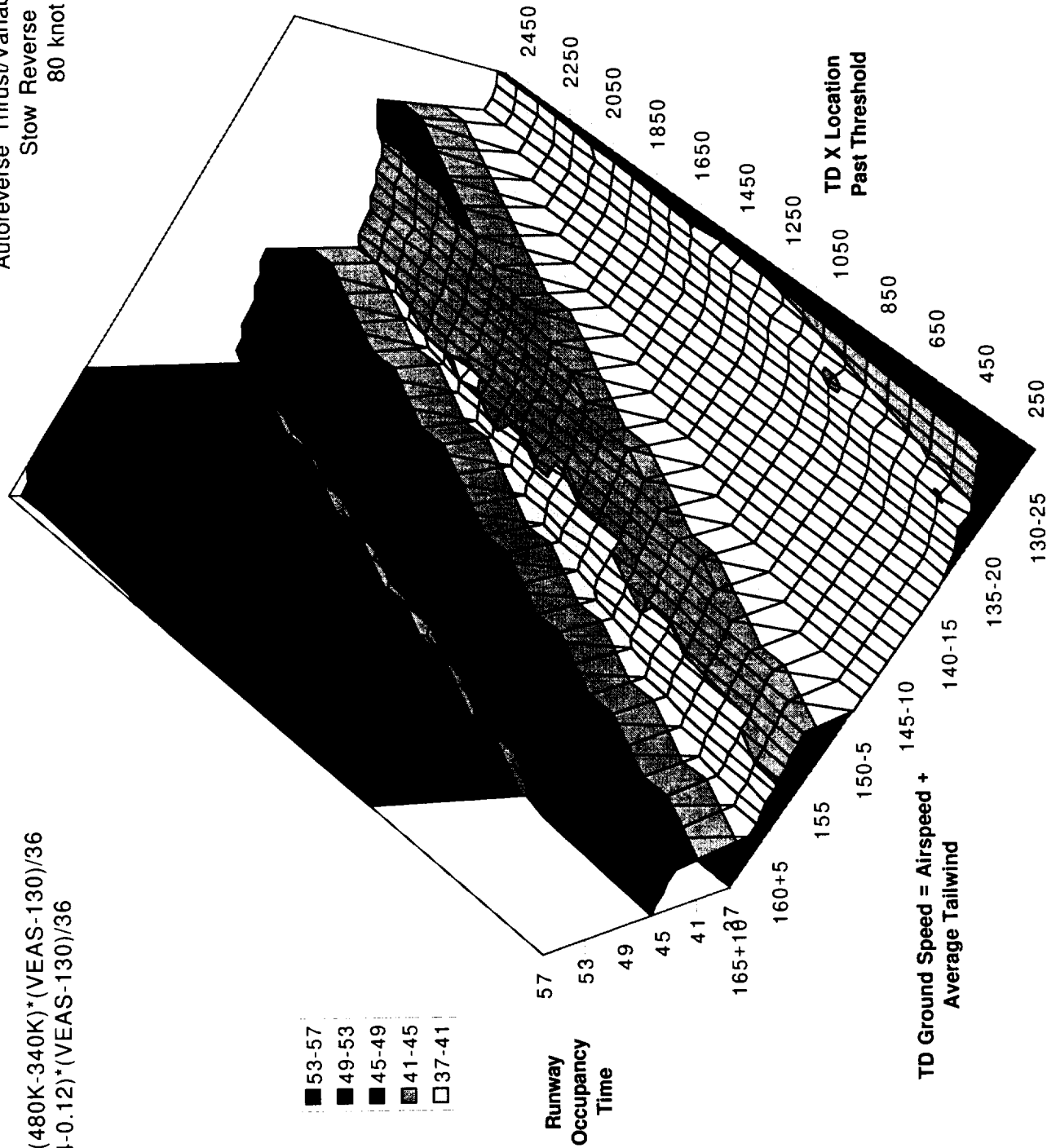
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

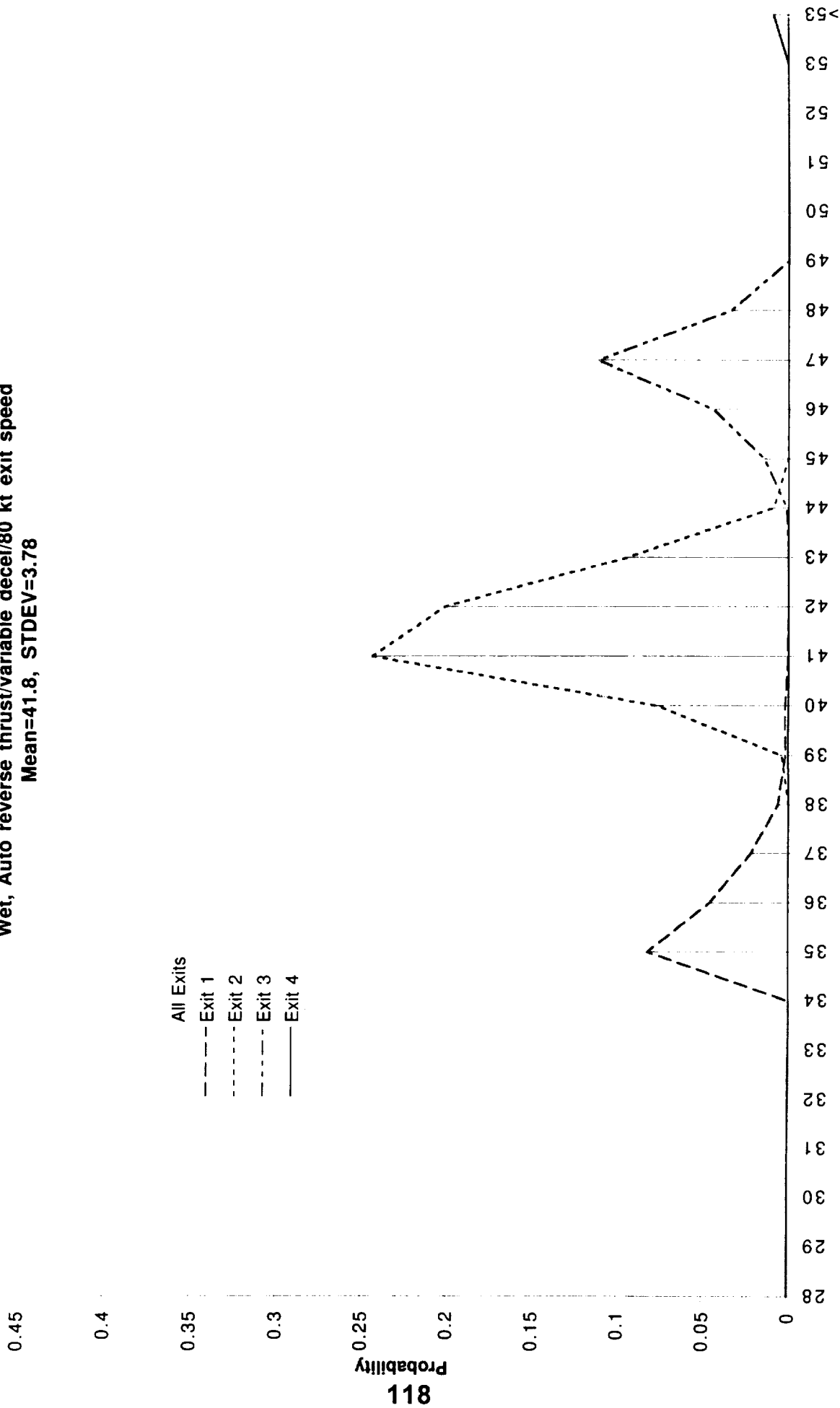
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=80 kt/gd
80 knot high speed exit



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/80 kt exit speed
Mean=41.8, STDEV=3.78



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

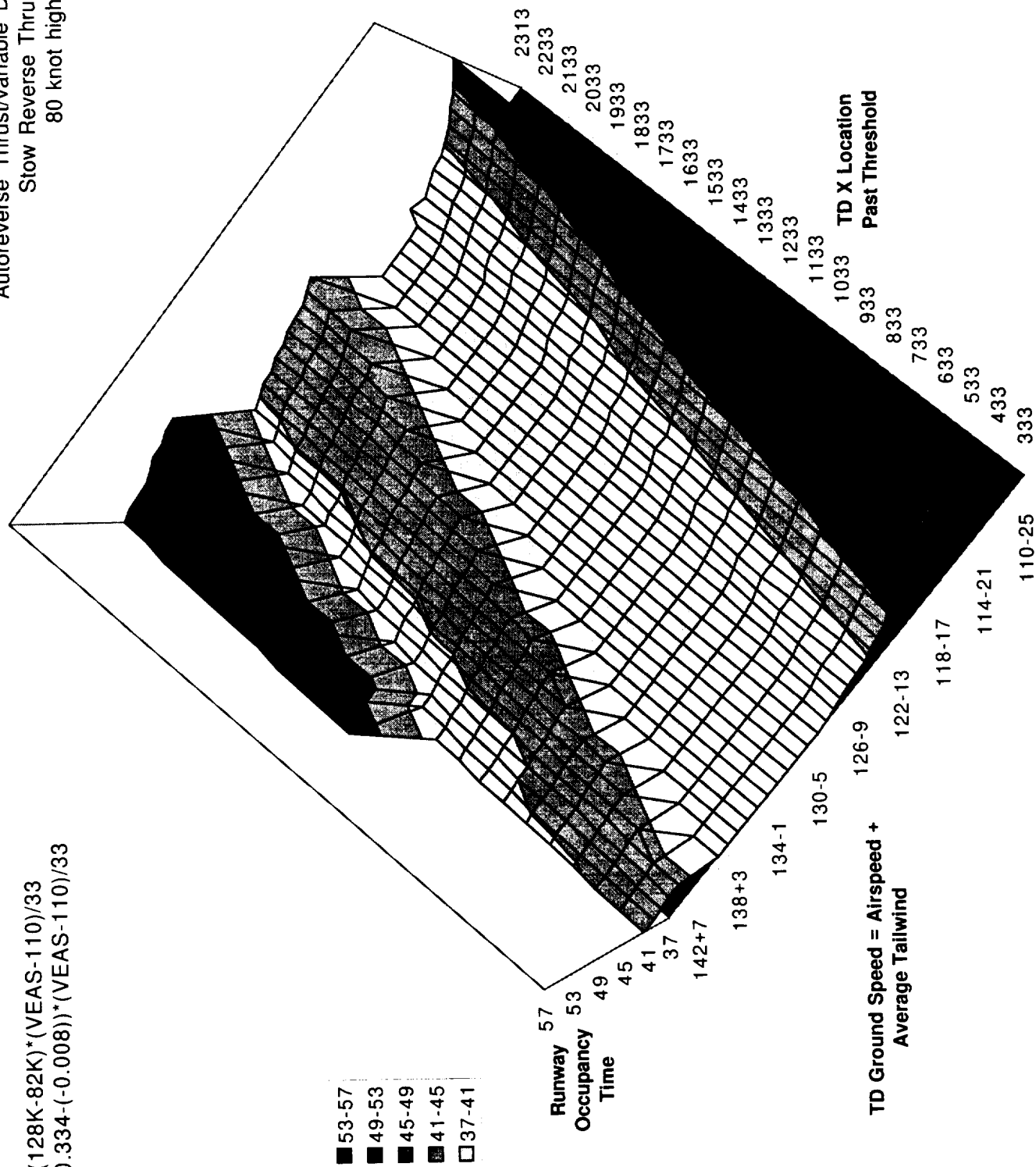
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

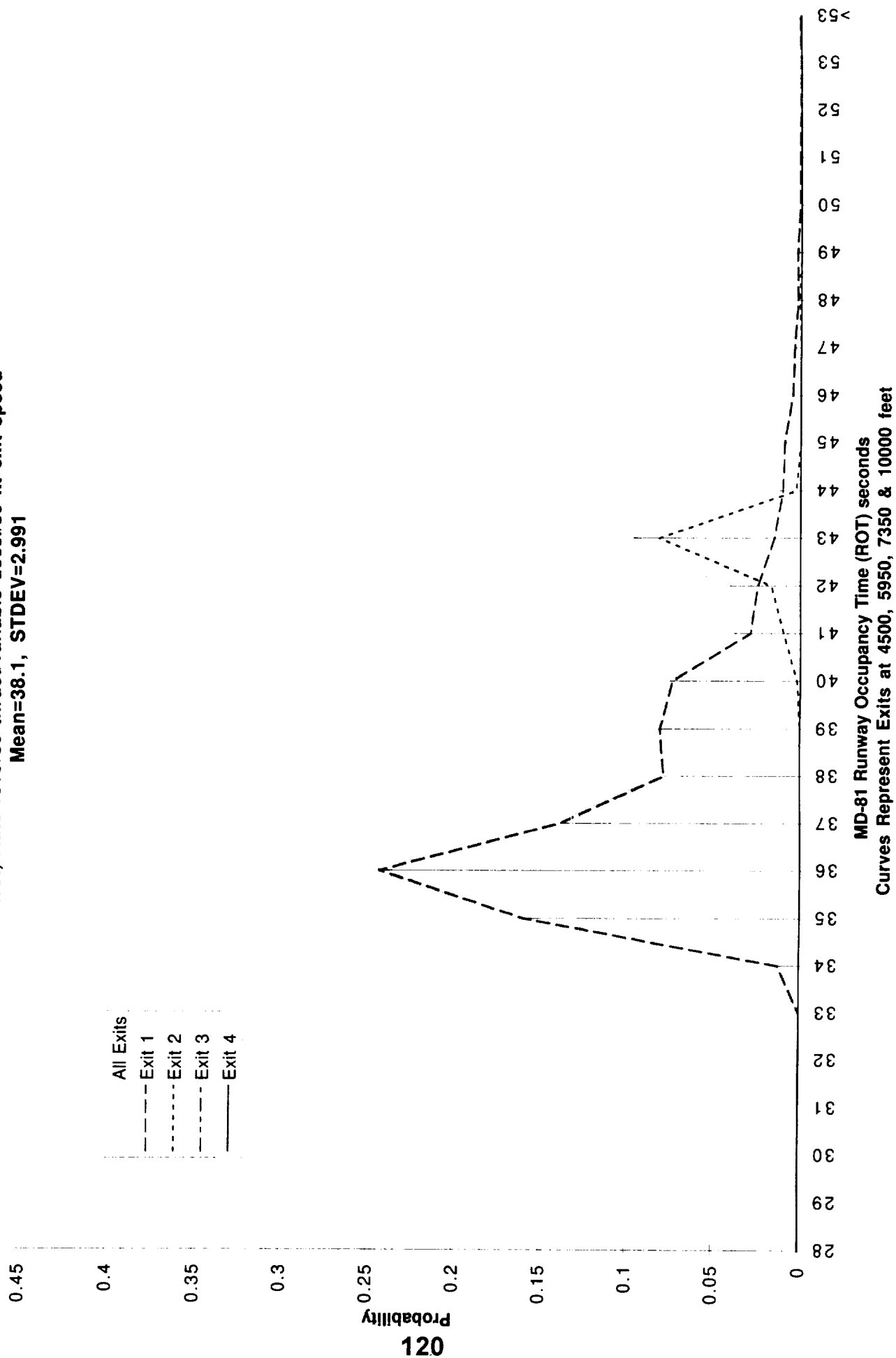
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=80 kt gd
80 knot high speed exit

MD-81 ROTO Occupancy Time



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/80 kt exit speed
Mean=38.1, STDEV=2.991



Wet, Exits=5500, 6950, 8350, 12000
 Autoreverse Thrust/Variable Deceleration
 Stow Reverse Thrust=60 kt/gd
 60 knot high speed exit

MD-11 ROTO Occupancy Time

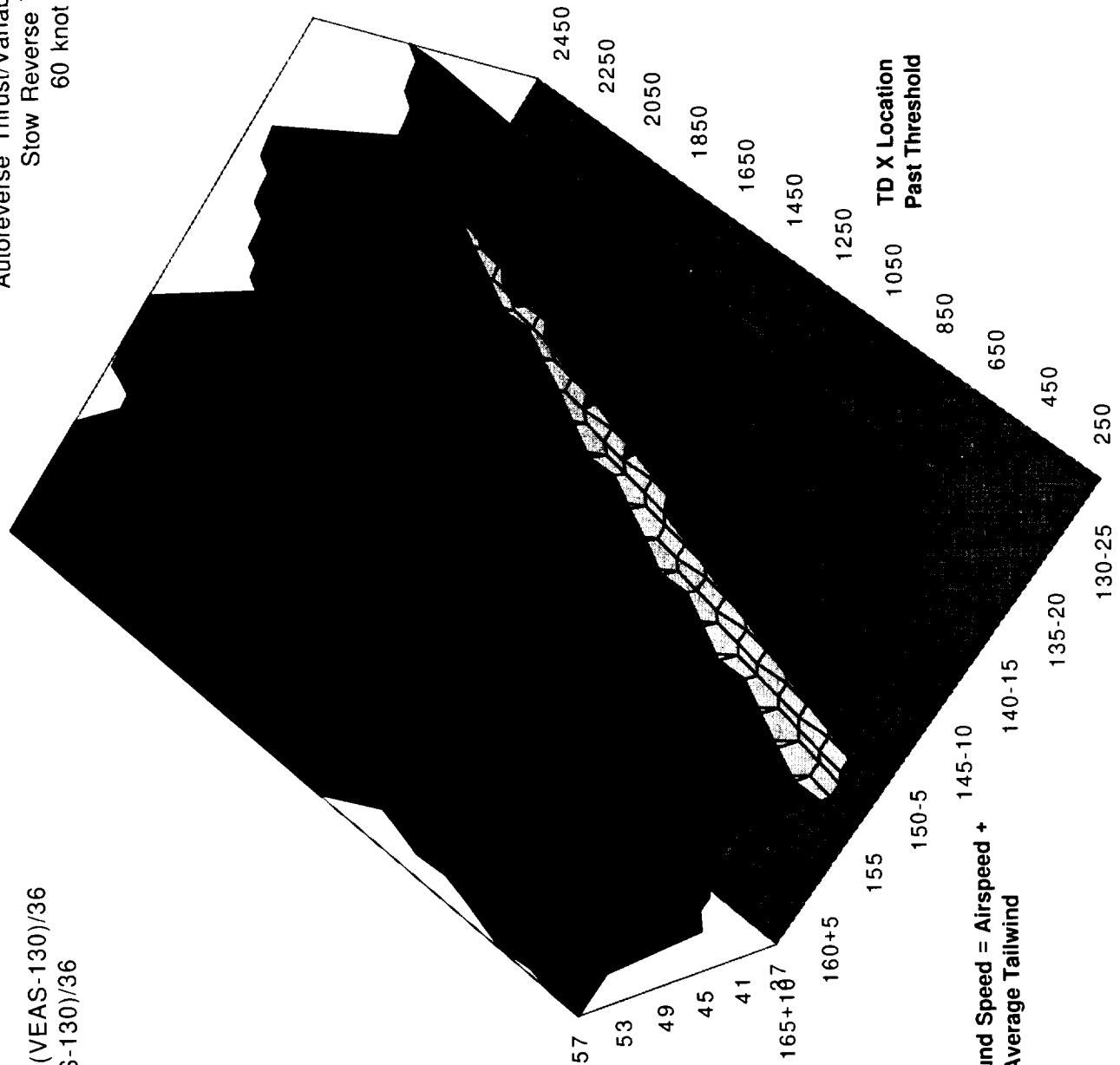
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

Runway
Occupancy
Time

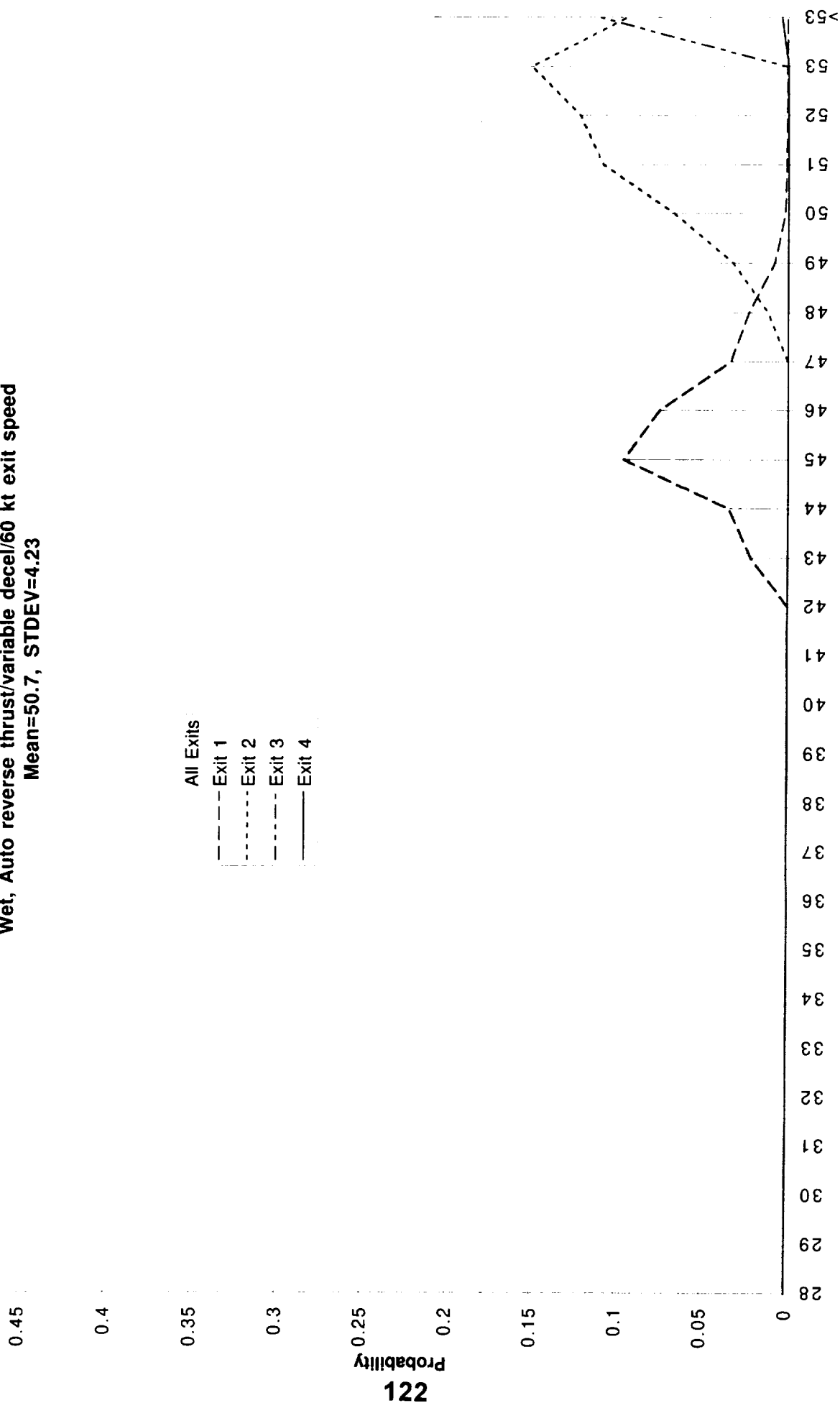


TD Ground Speed = Airspeed +
Average Tailwind

MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/60 kt exit speed
Mean=50.7, STDEV=4.23

All Exits
Exit 1
Exit 2
Exit 3
Exit 4

MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 5500, 6950, 8350 & 12000 feet



Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

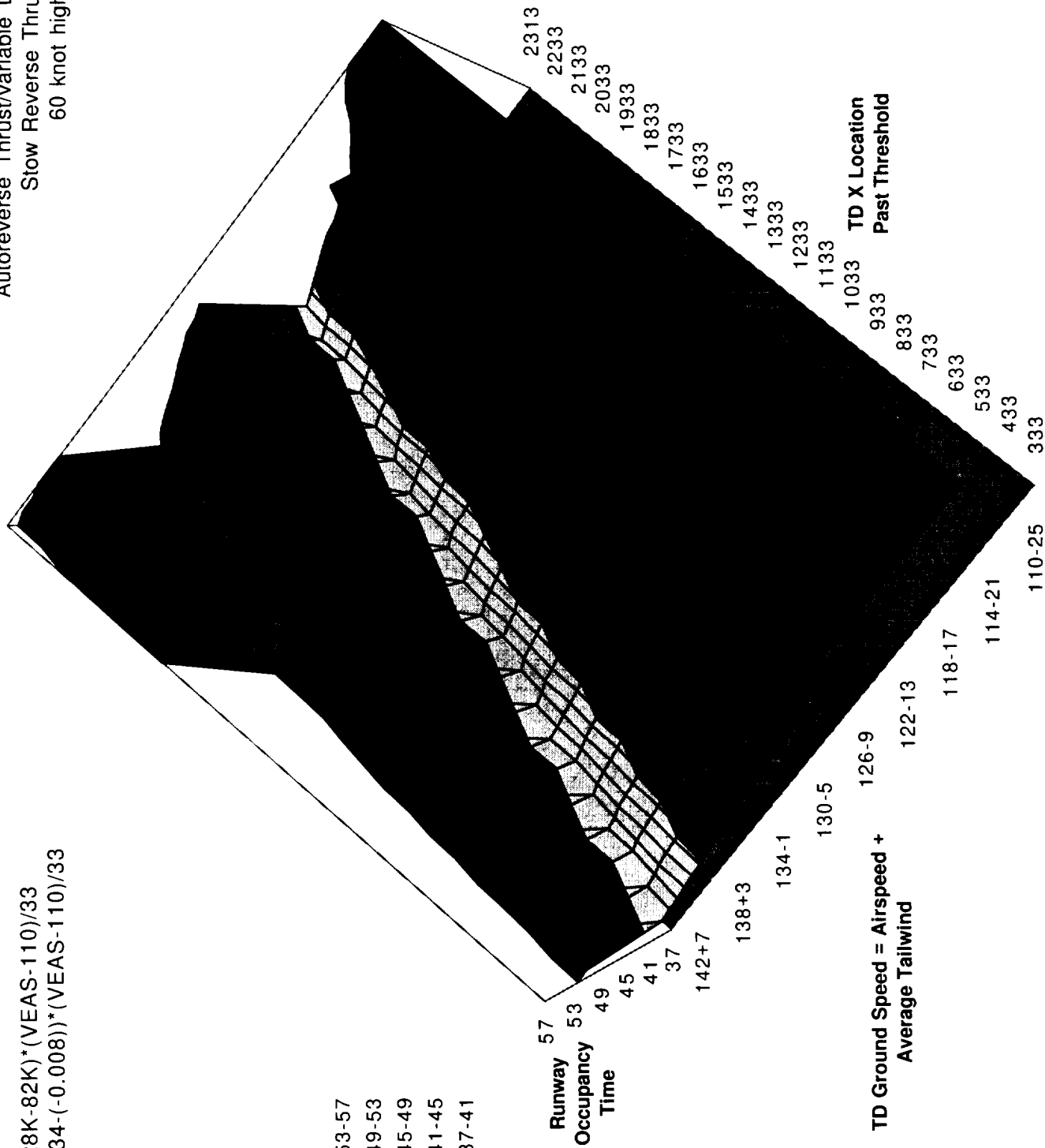
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

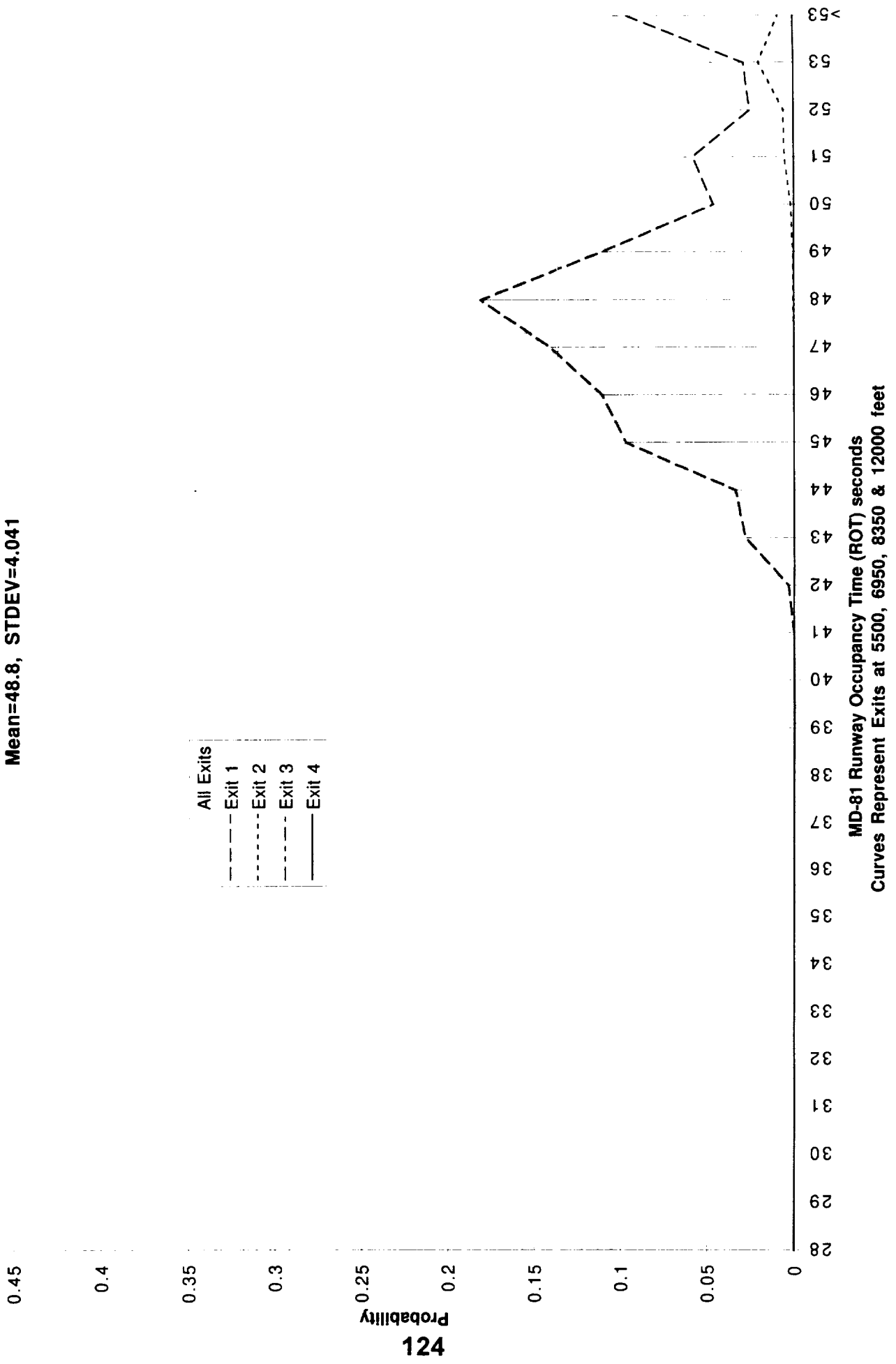
Wet, Exits=5500, 6950, 8350, 12000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=60 kt gd
60 knot high speed exit

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

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MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/60 kt exit speed
Mean=48.8, STDEV=4.041

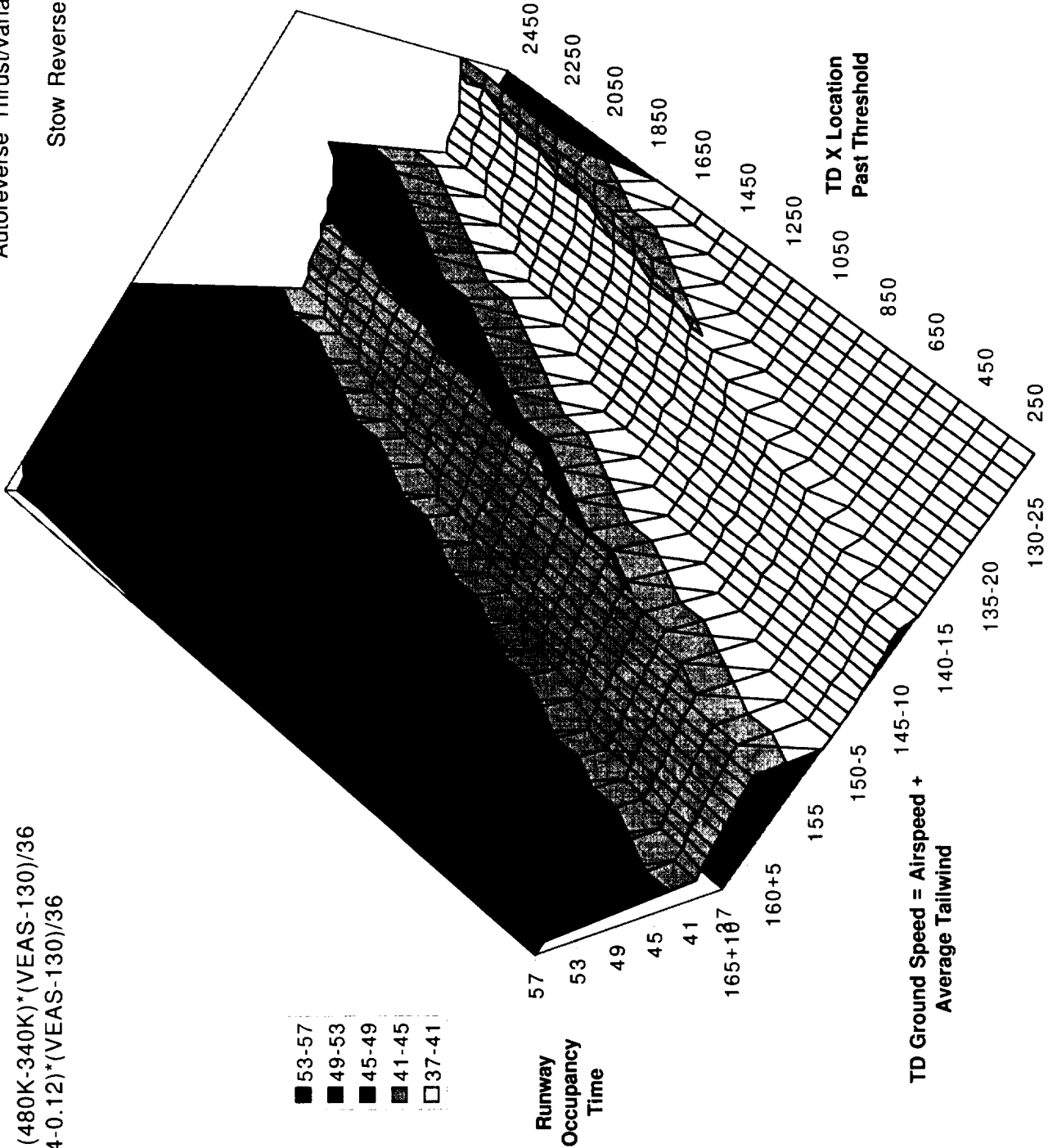


Predict exit prior to TD

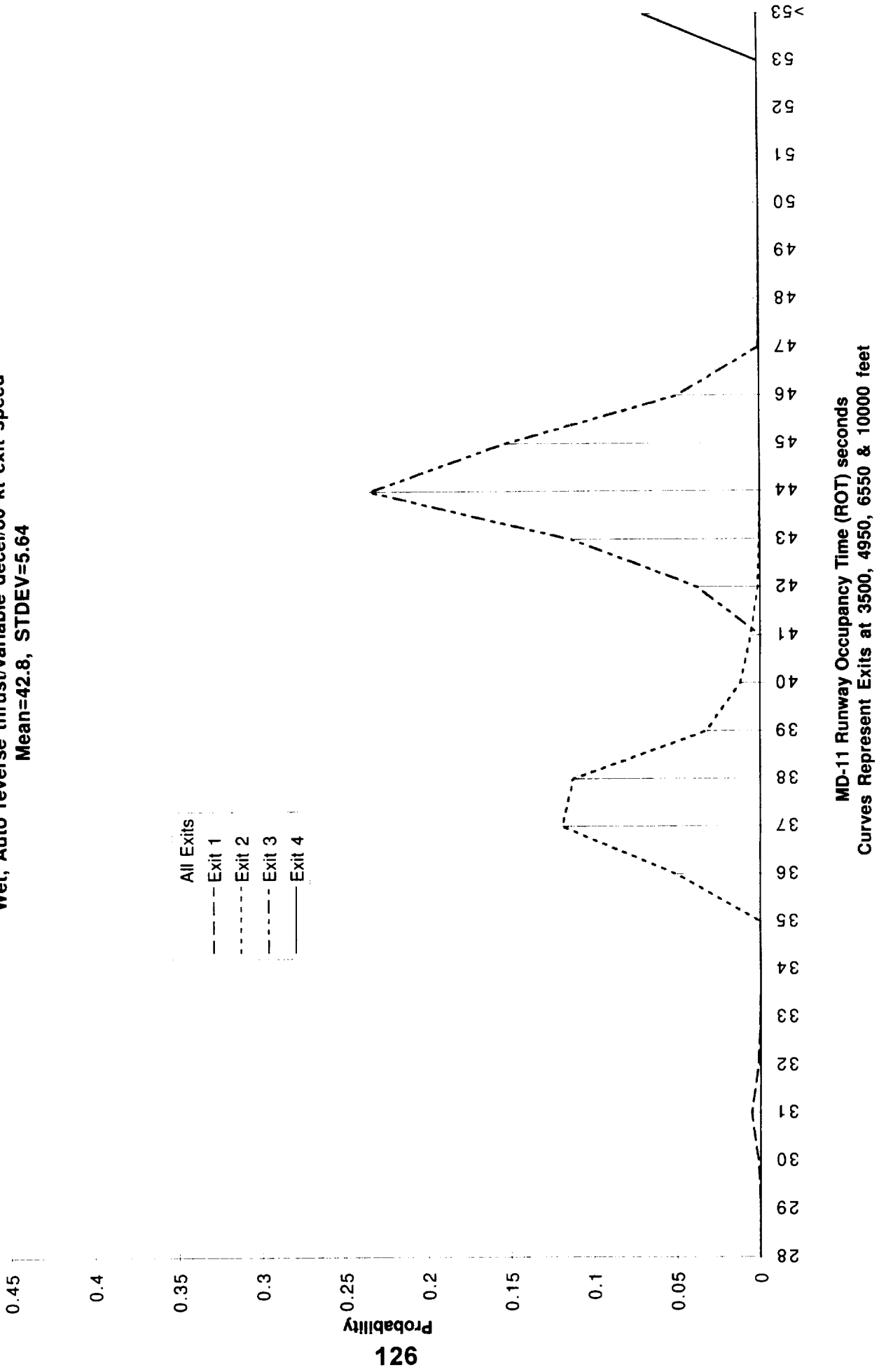
$Weight = 340K + (480K - 340K) * (VEAS - 130) / 36$
 $CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$

MD-11 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Autoreverse Thrust/variable Deceleration
80 kt exit speed
Stow Reverse Thrust=80 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/80 kt exit speed
Mean=42.8, STDEV=5.64



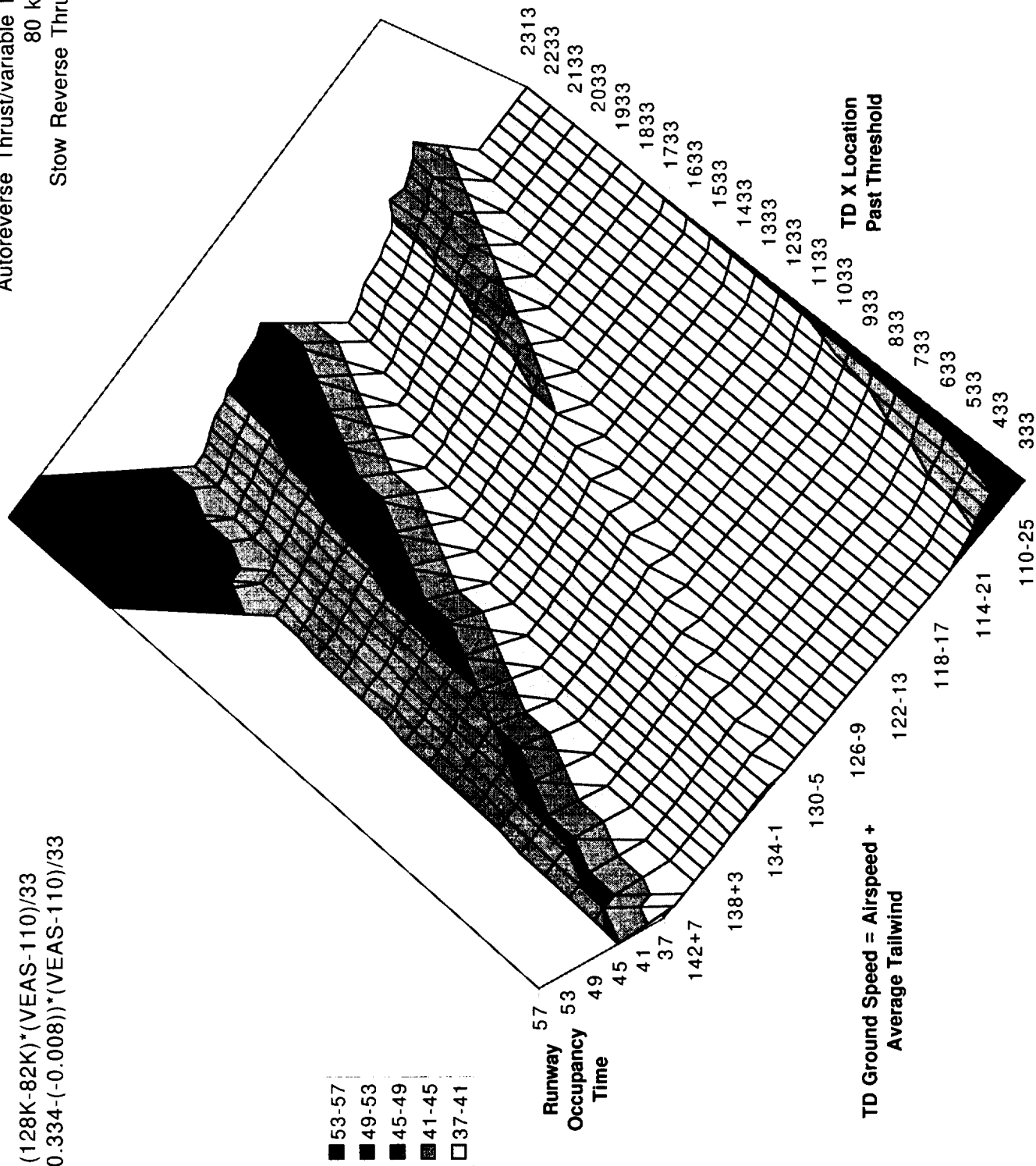
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

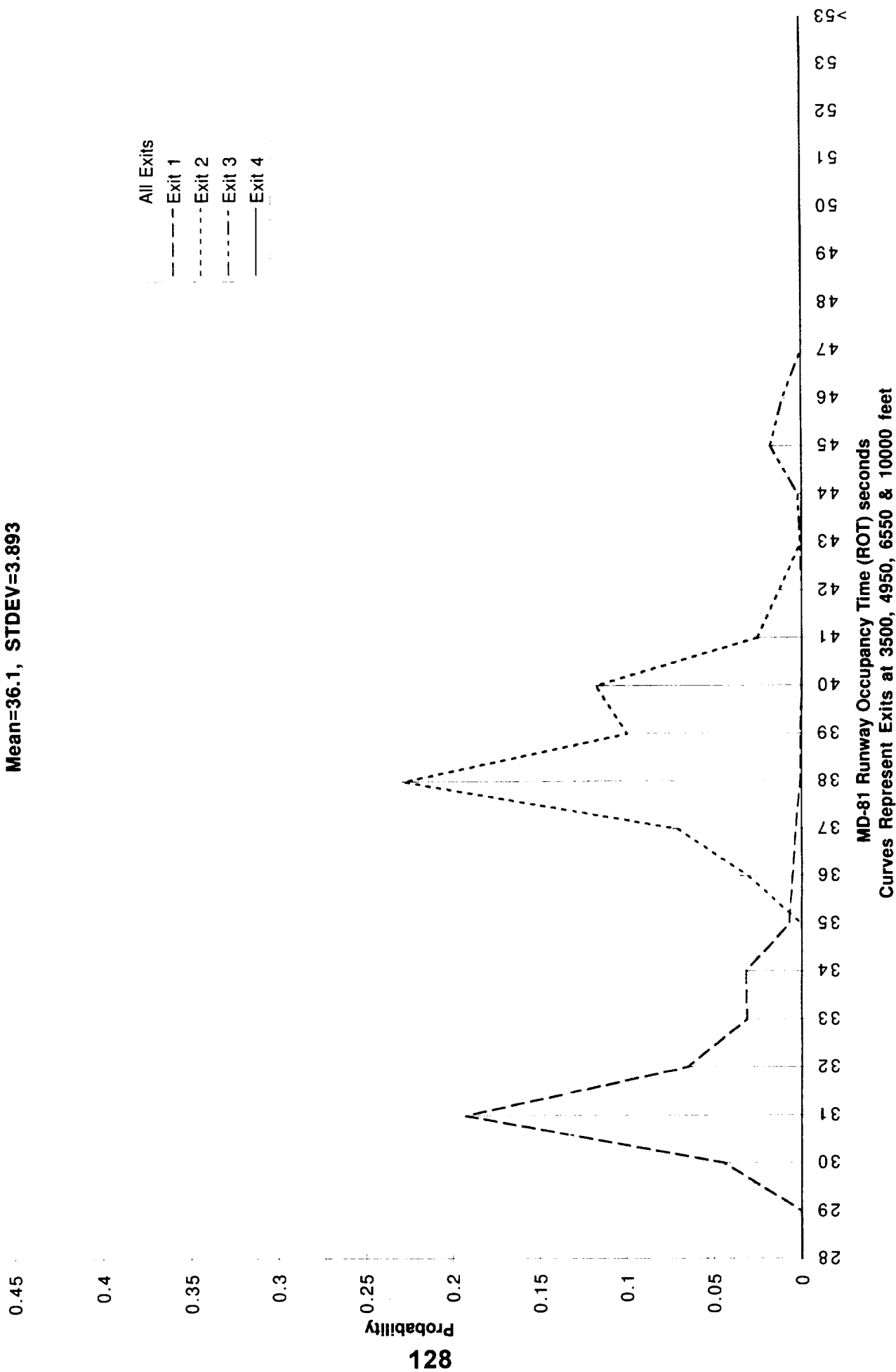
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Autoreverse Thrust/variable Deceleration
80 kt exit speed
Slow Reverse Thrust=80 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/80 kt exit speed
Mean=36.1, STDEV=3.893



Predict exit prior to TD

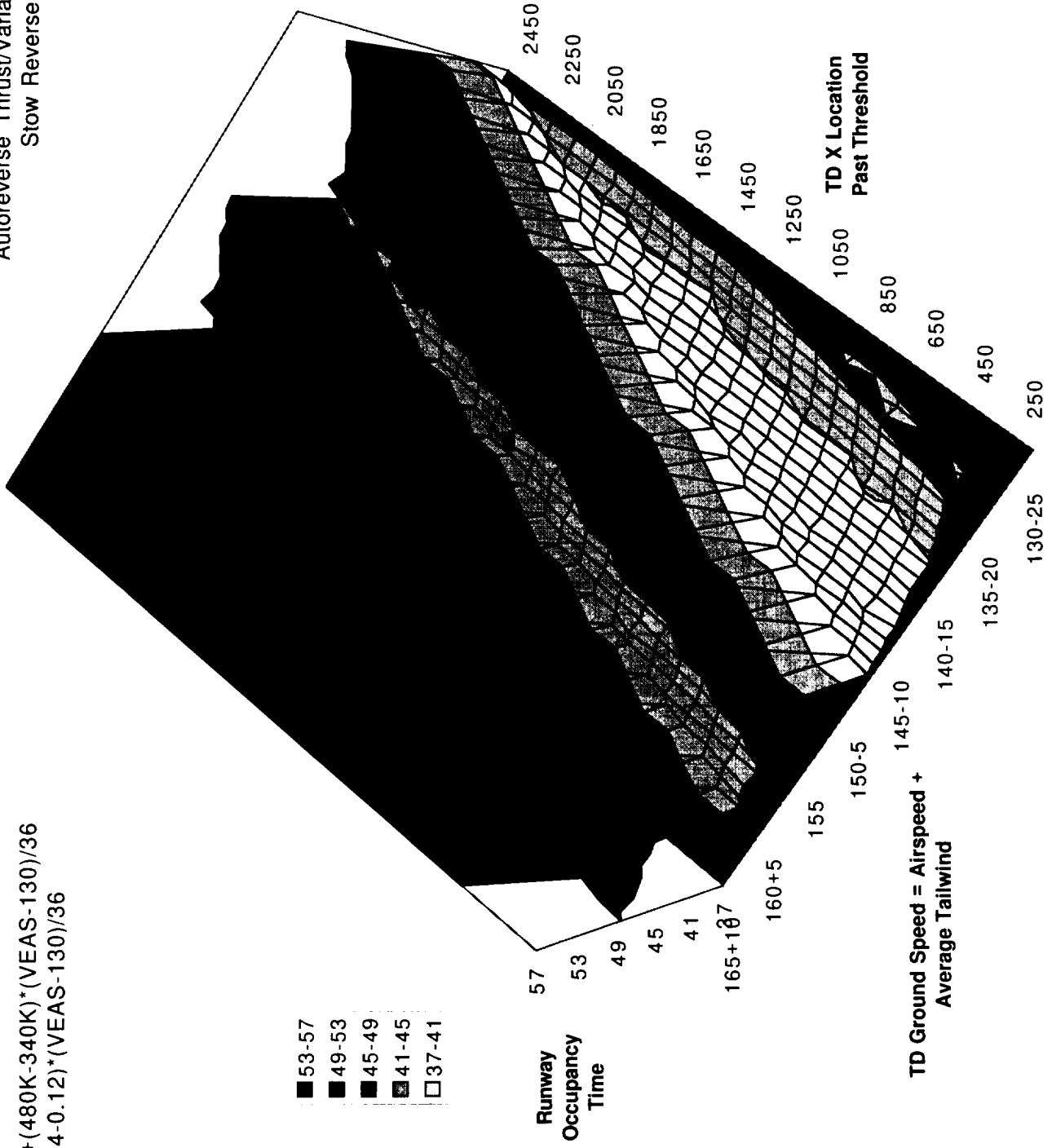
$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd

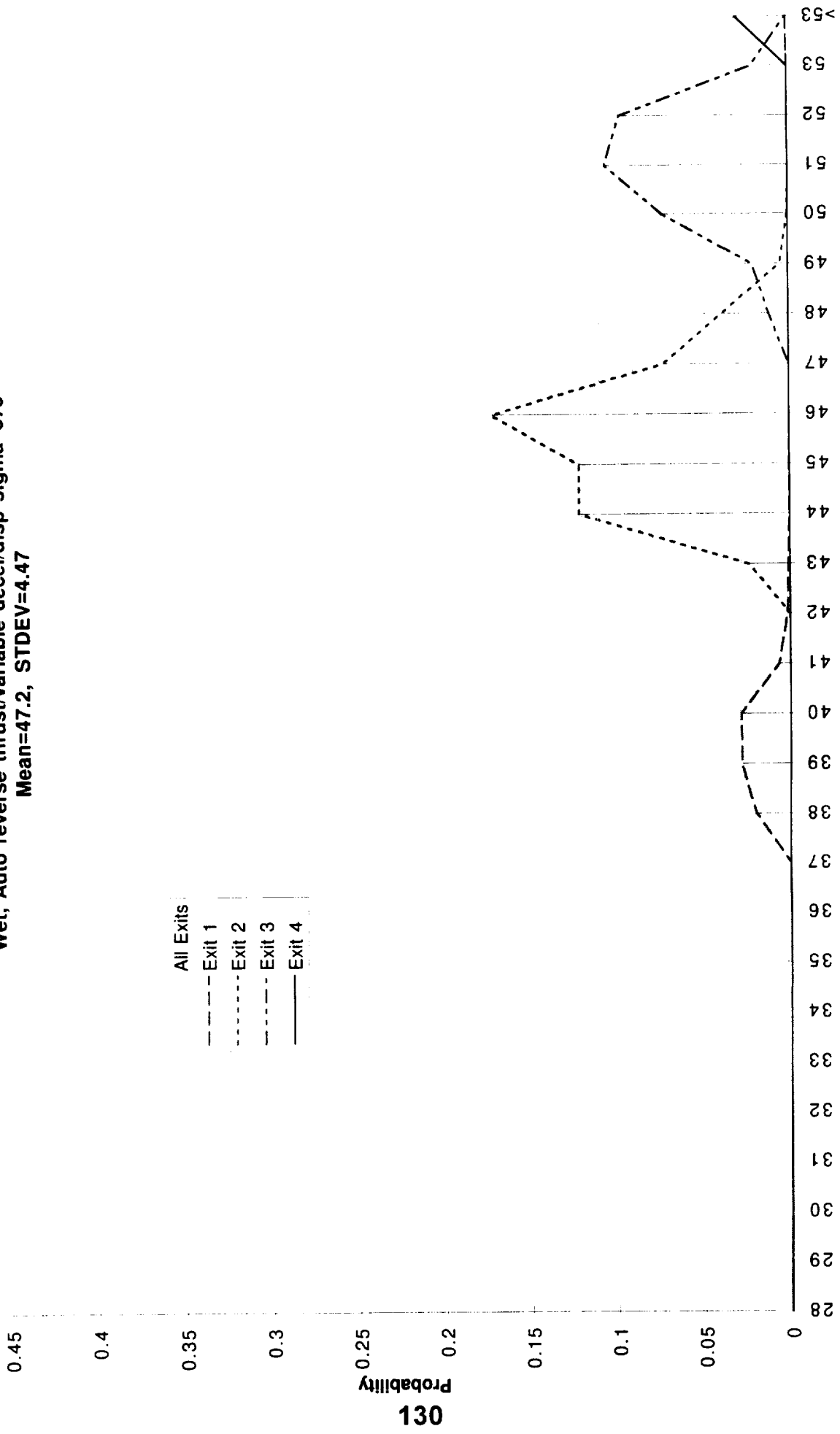
- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/disp sigma=375
Mean=47.2, STDEV=4.47



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

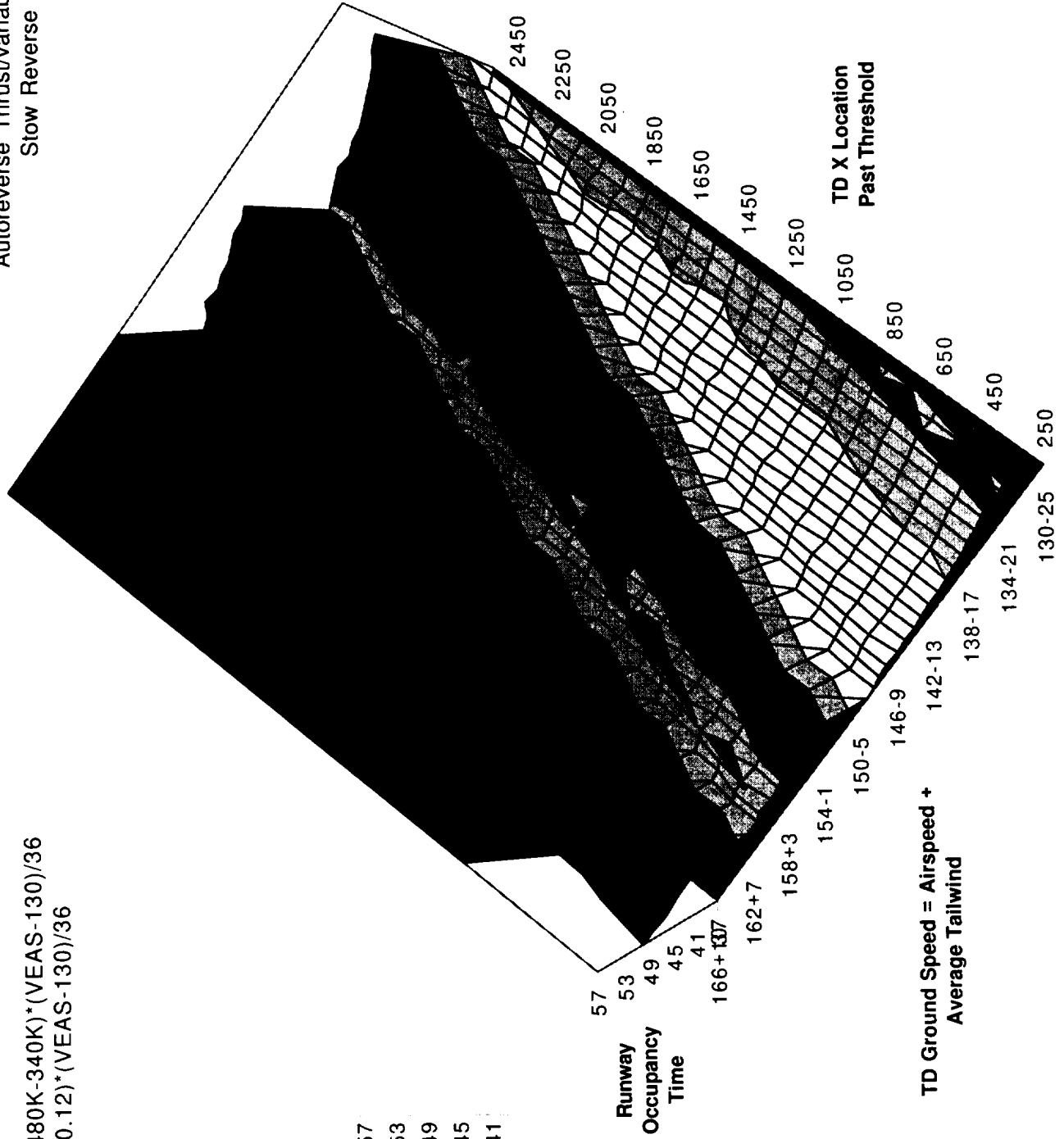
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

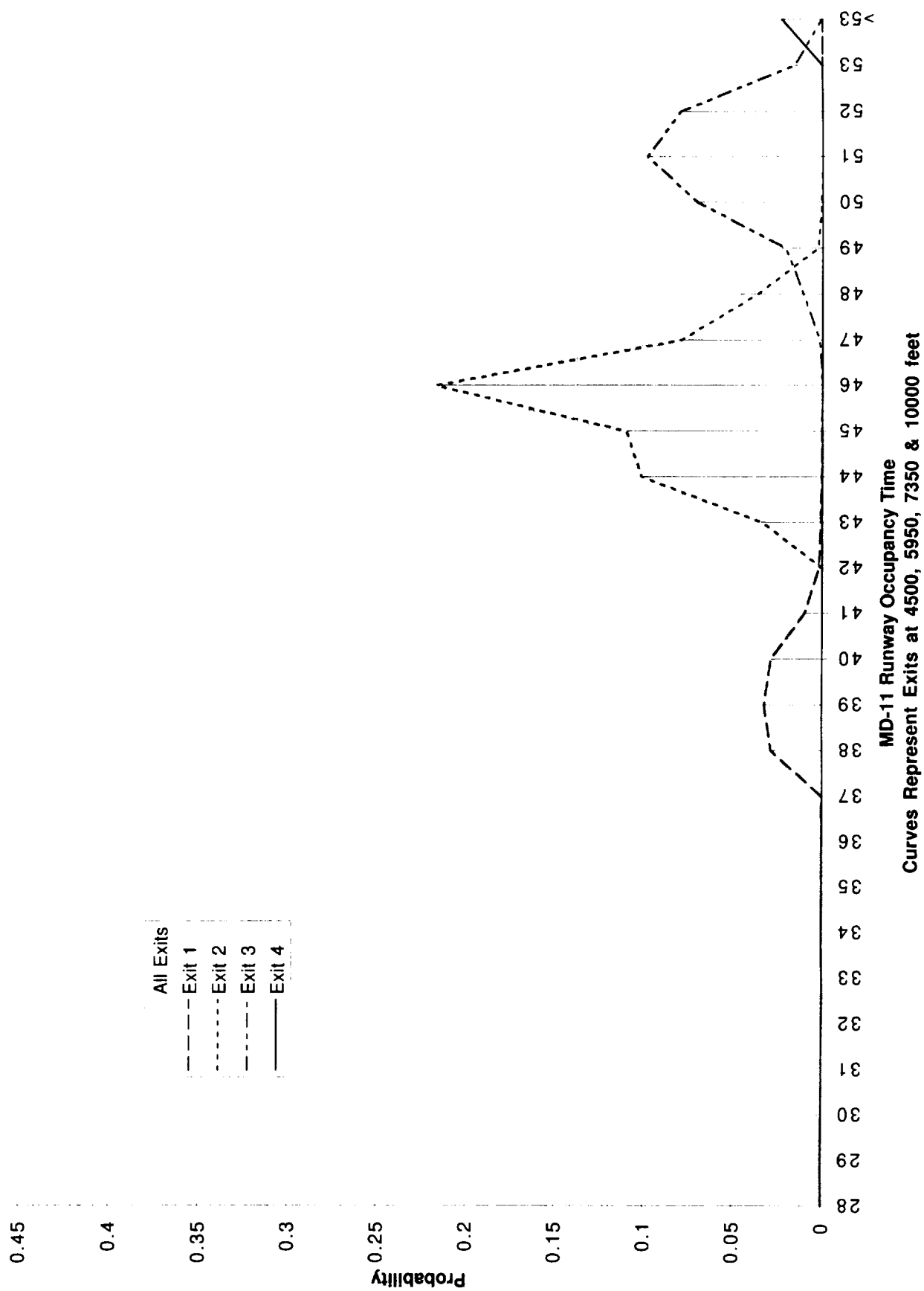
MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-11 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/dispersion sigma=375
 Mean=46.8, STDEV=4.321



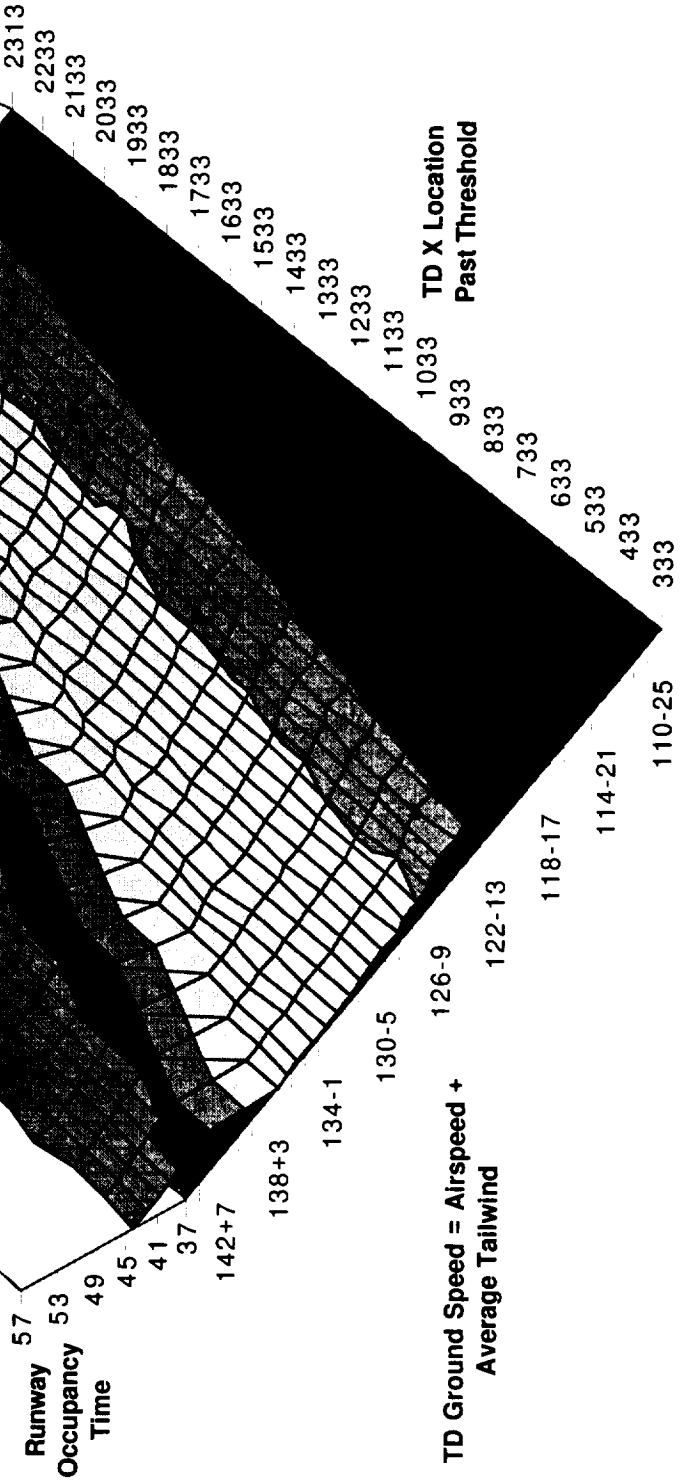
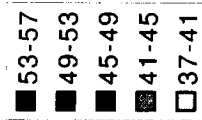
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

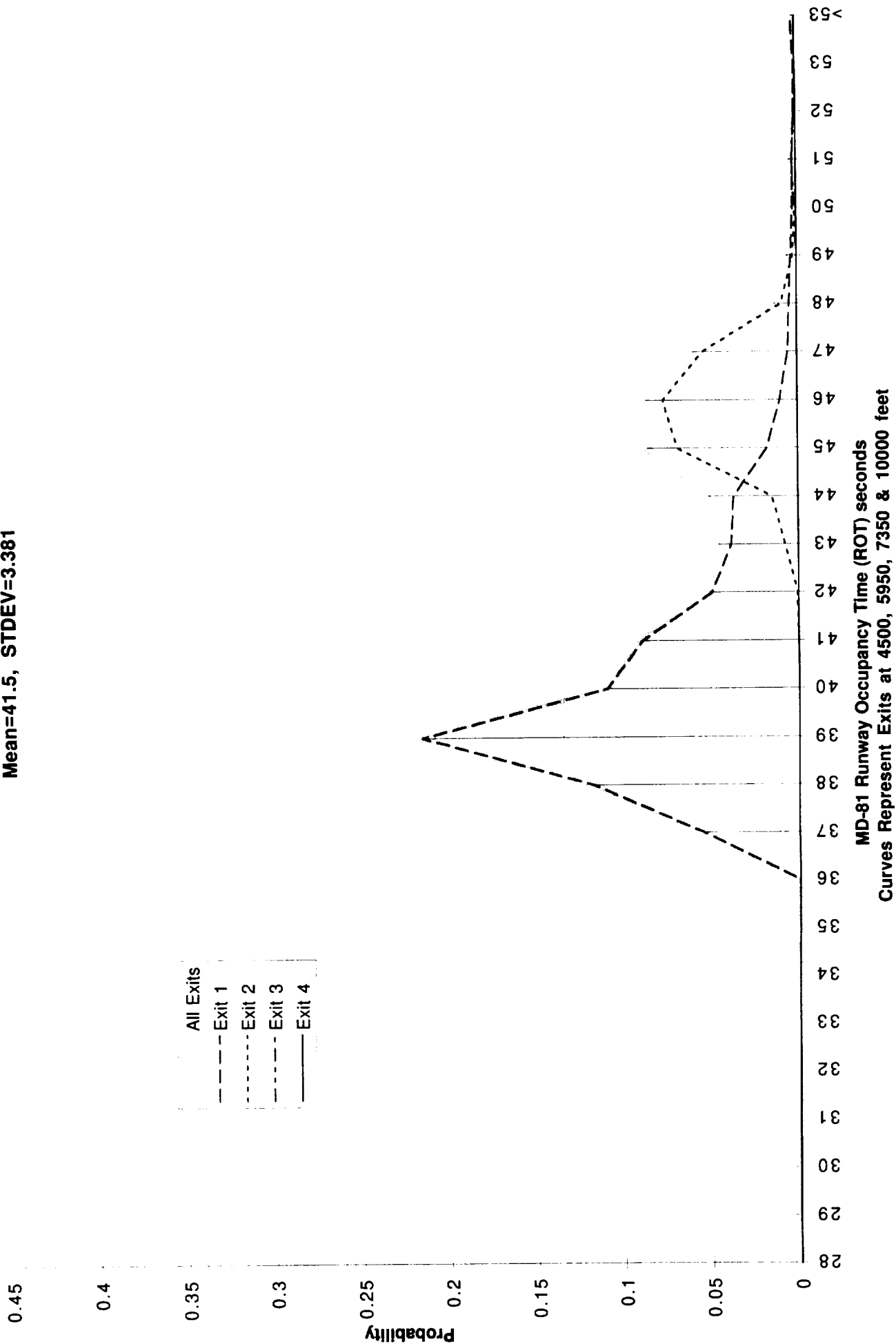
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500,5950,7350,10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/dispersion sigma=375
Mean=41.5, STDEV=3.381

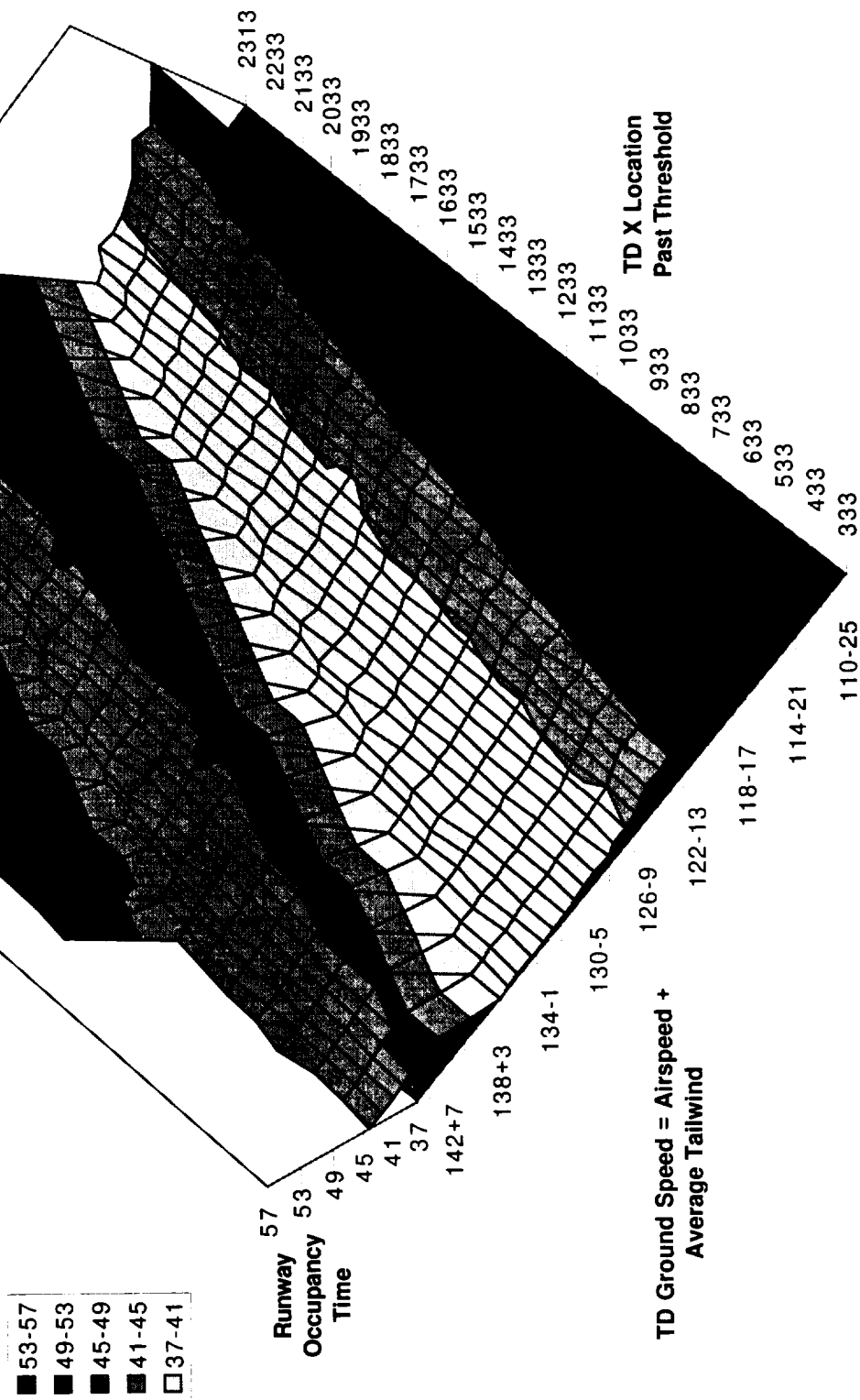


Predict exit prior to TD

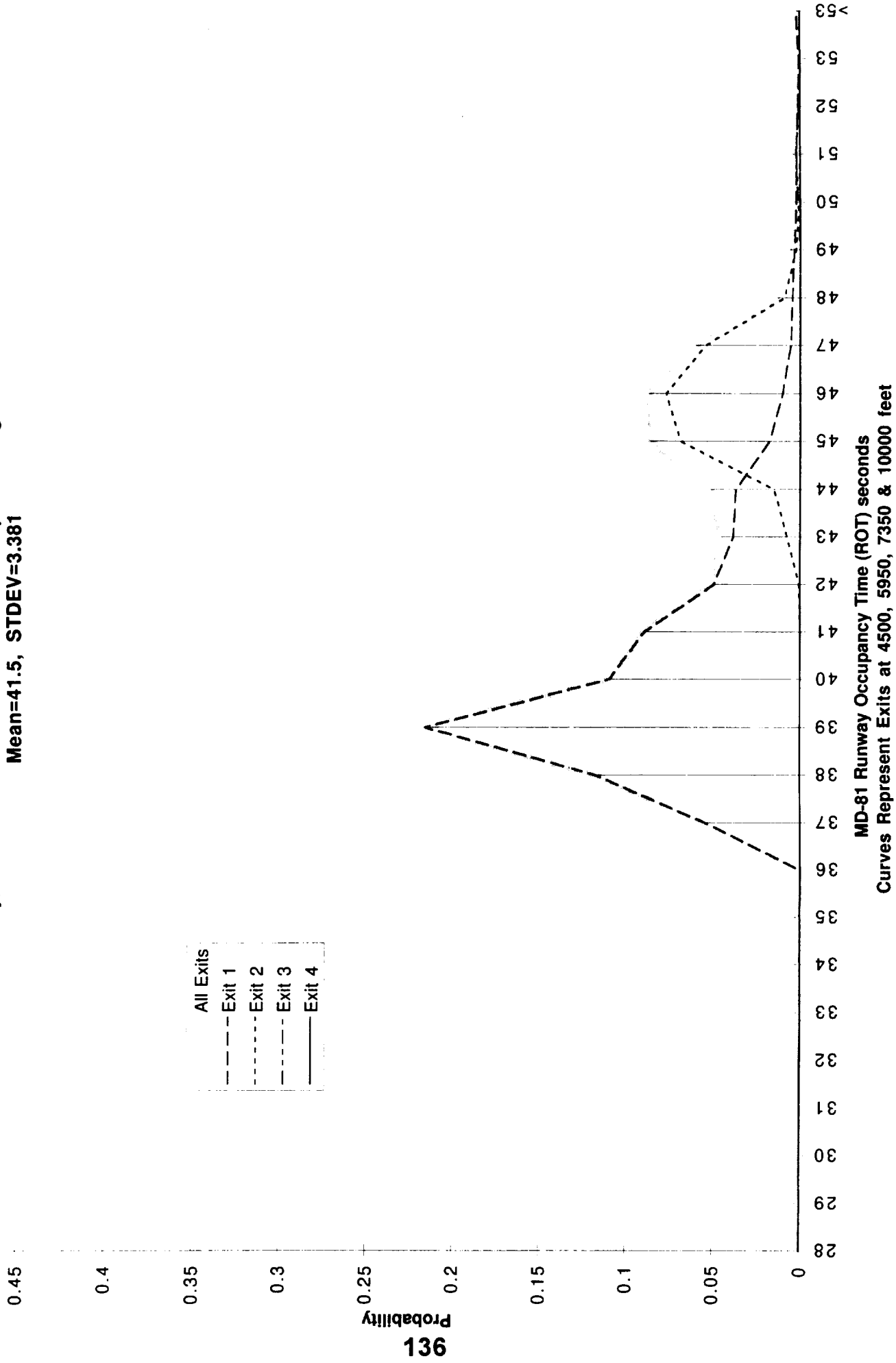
$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/dispersion sigma=375
 Mean=41.5, STDEV=3.381



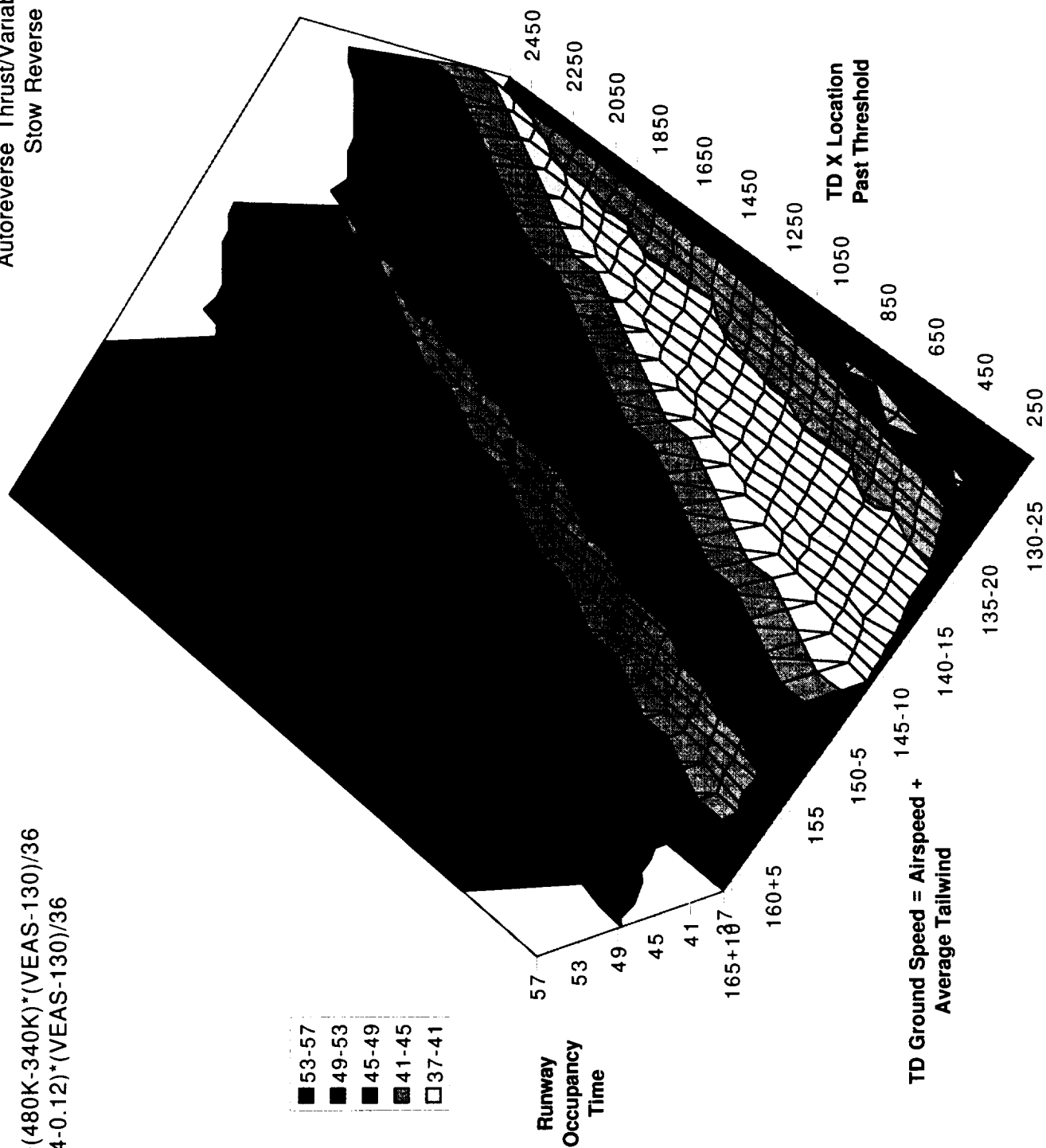
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

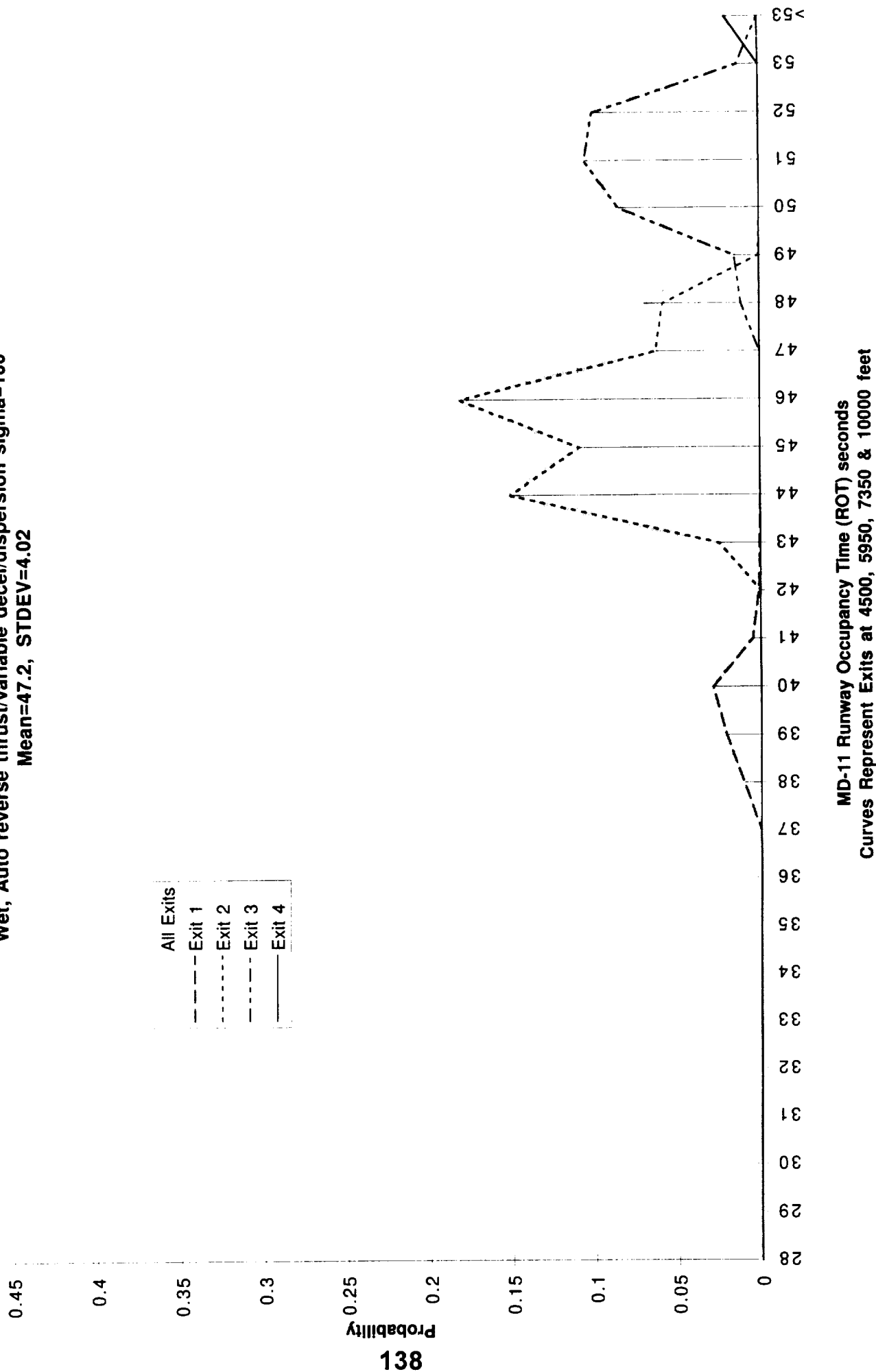
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/dispersion sigma=100
Mean=47.2, STDEV=4.02



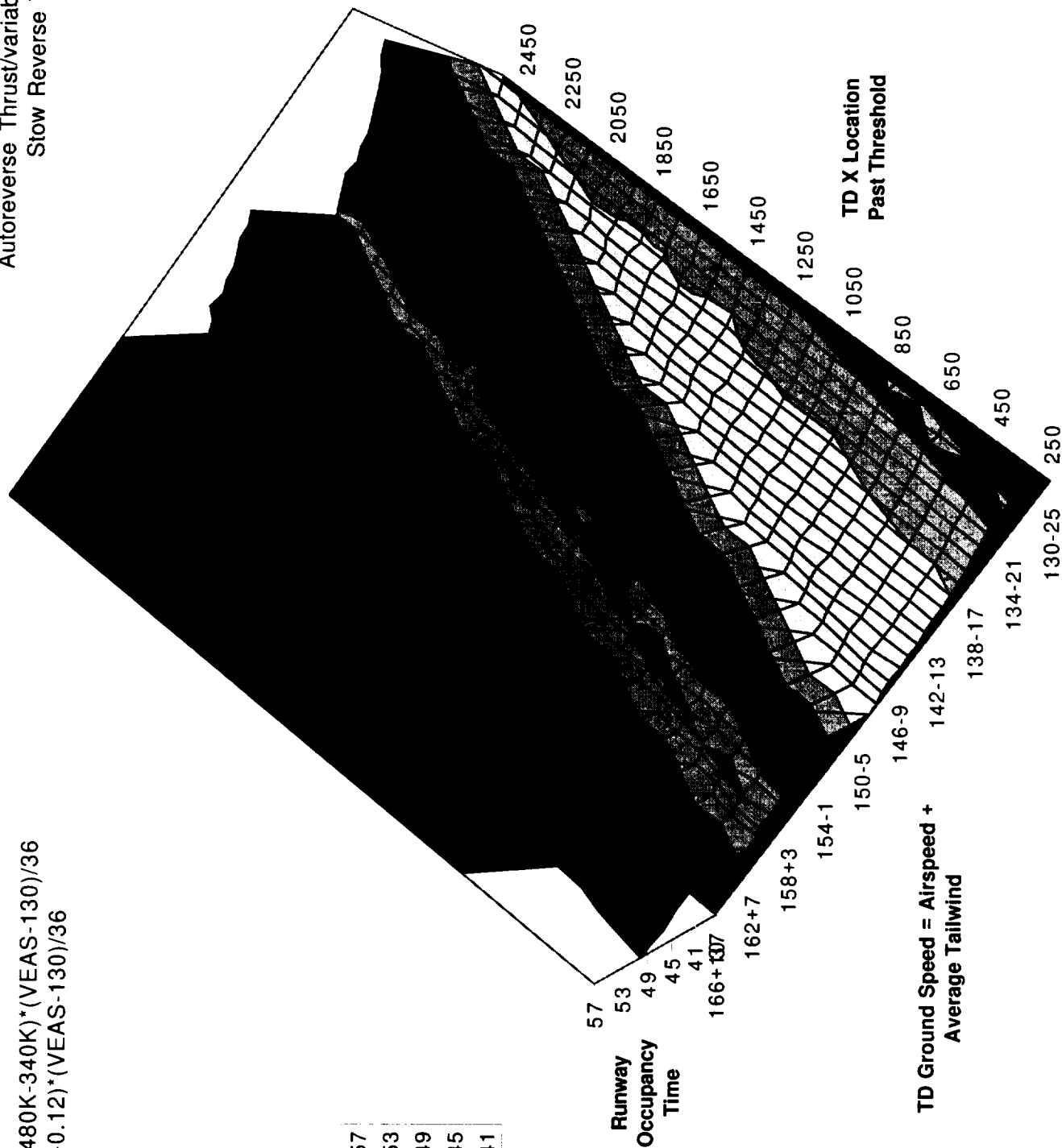
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

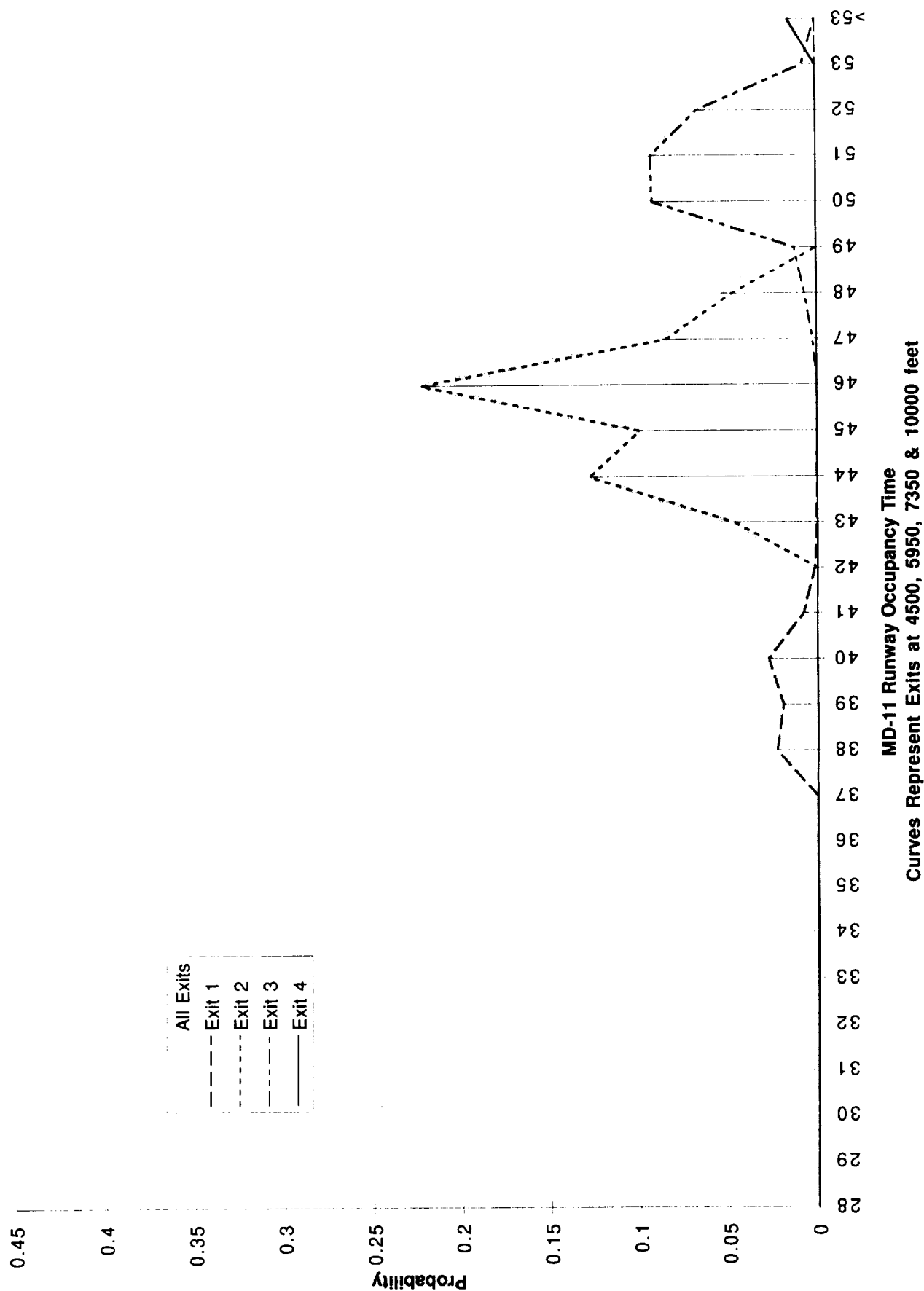
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt/gd



MD-11 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/dispersion sigma=100
 Mean=46.7, STDEV=3.871



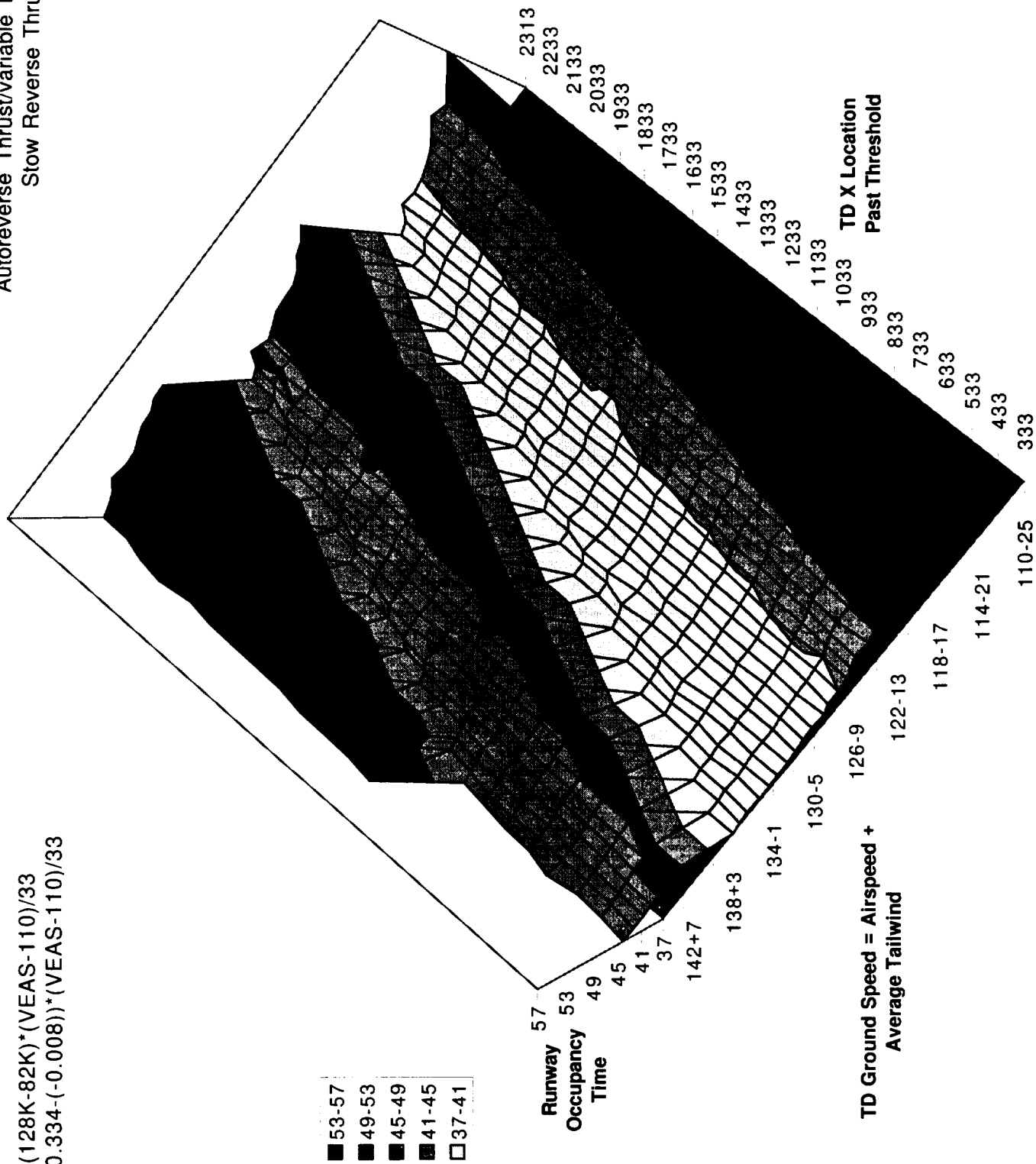
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

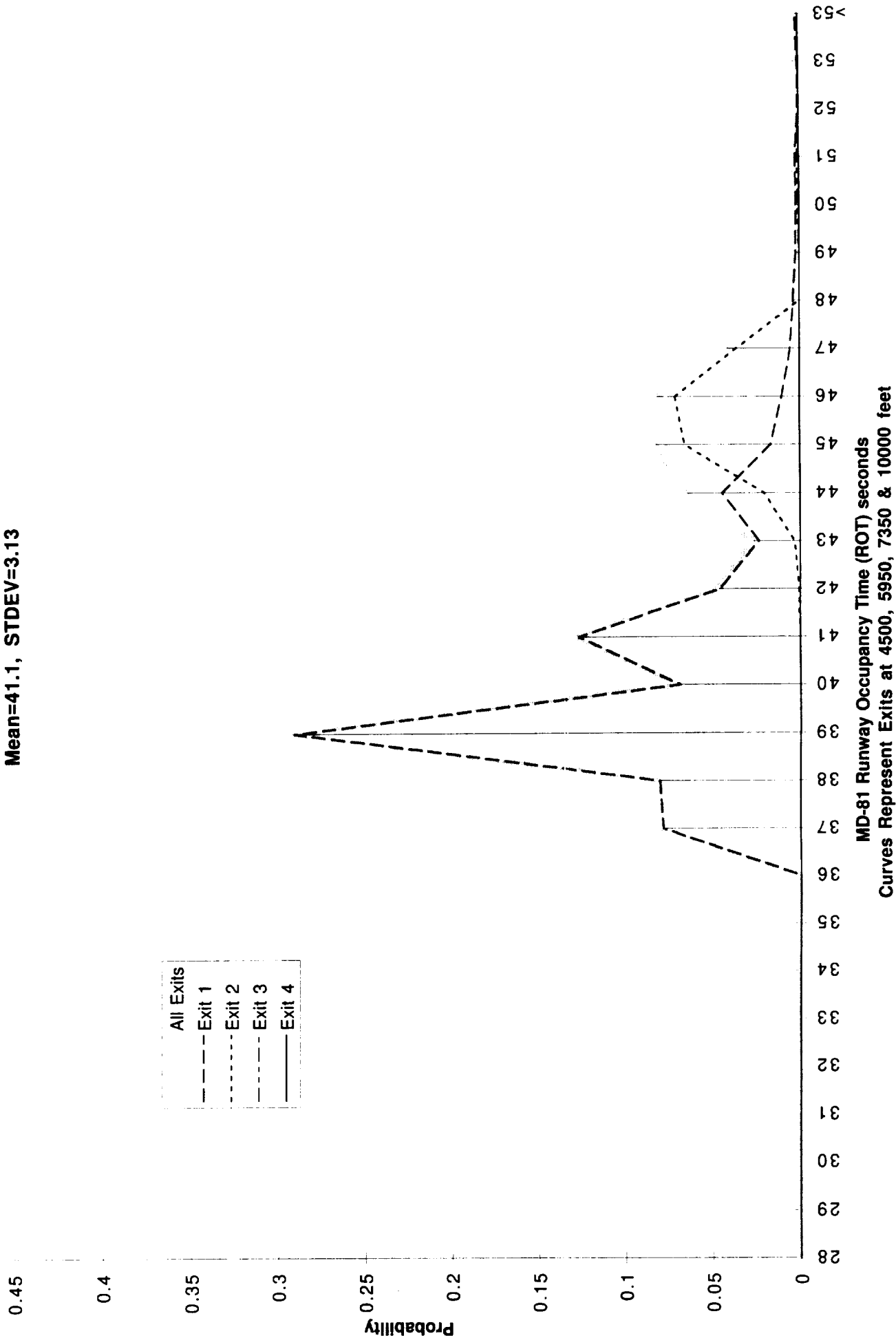
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/dispersion sigma=100
Mean=41.1, STDEV=3.13



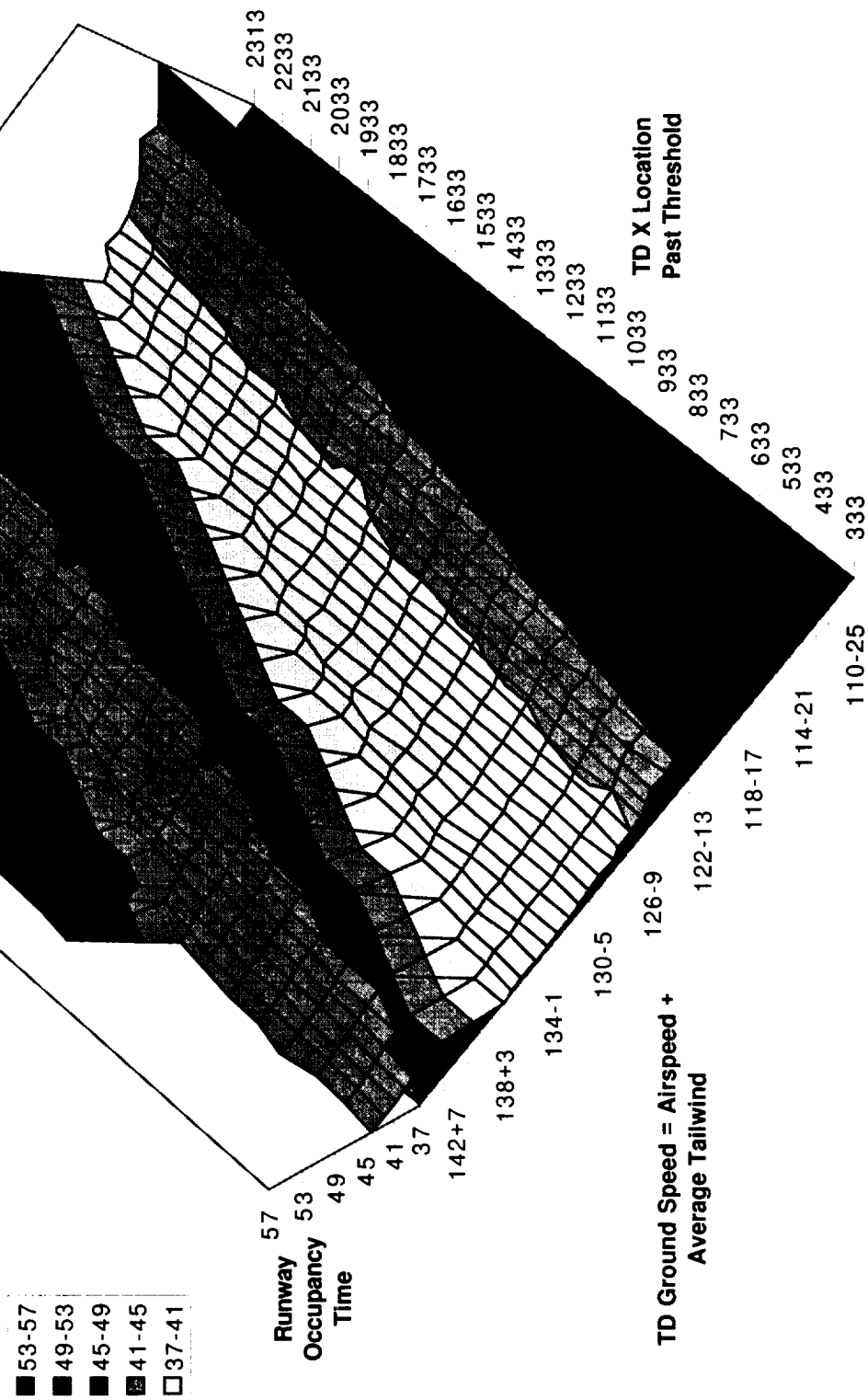
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

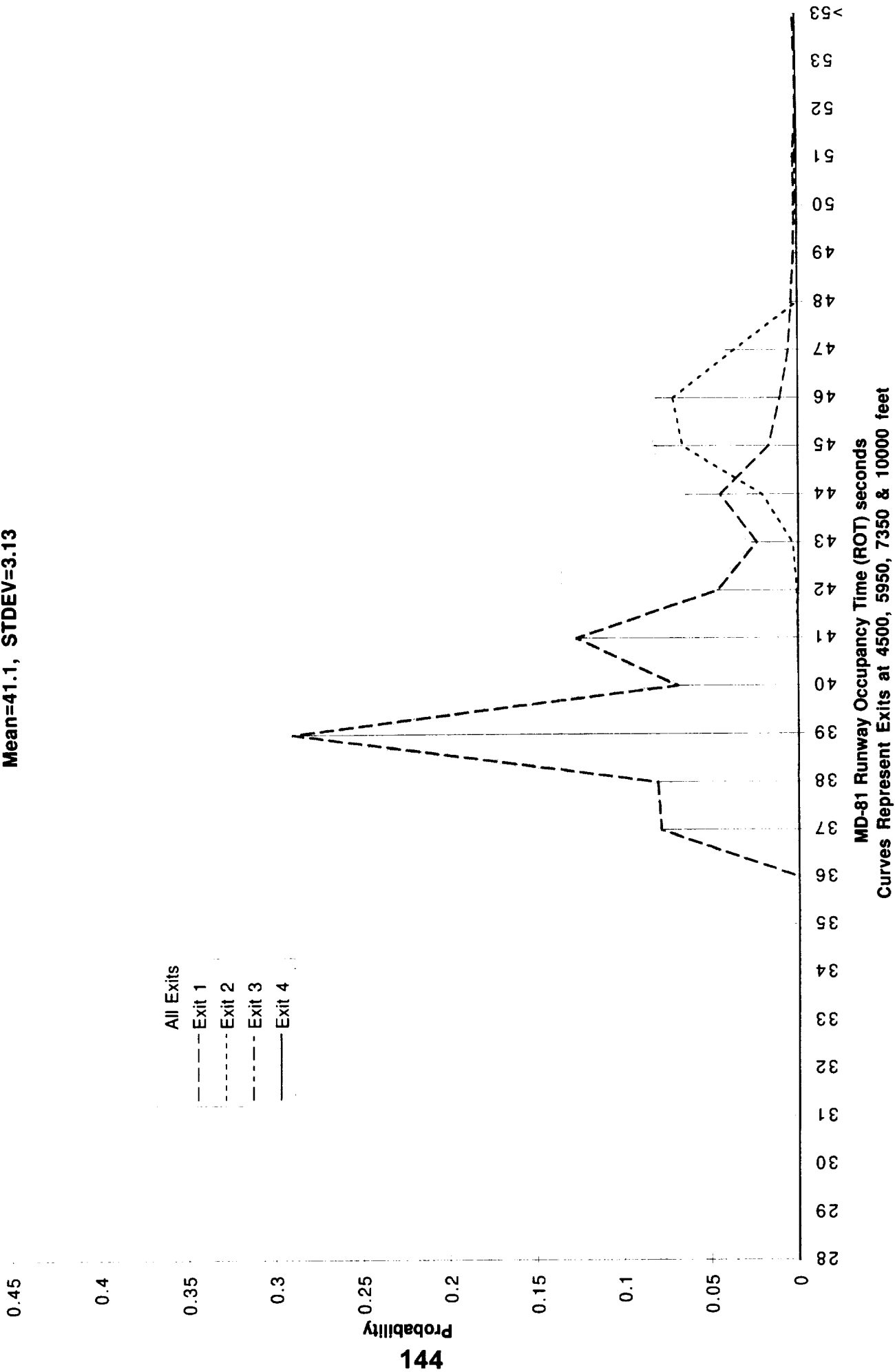
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/dispersion sigma=100
 Mean=41.1, STDEV=3.13



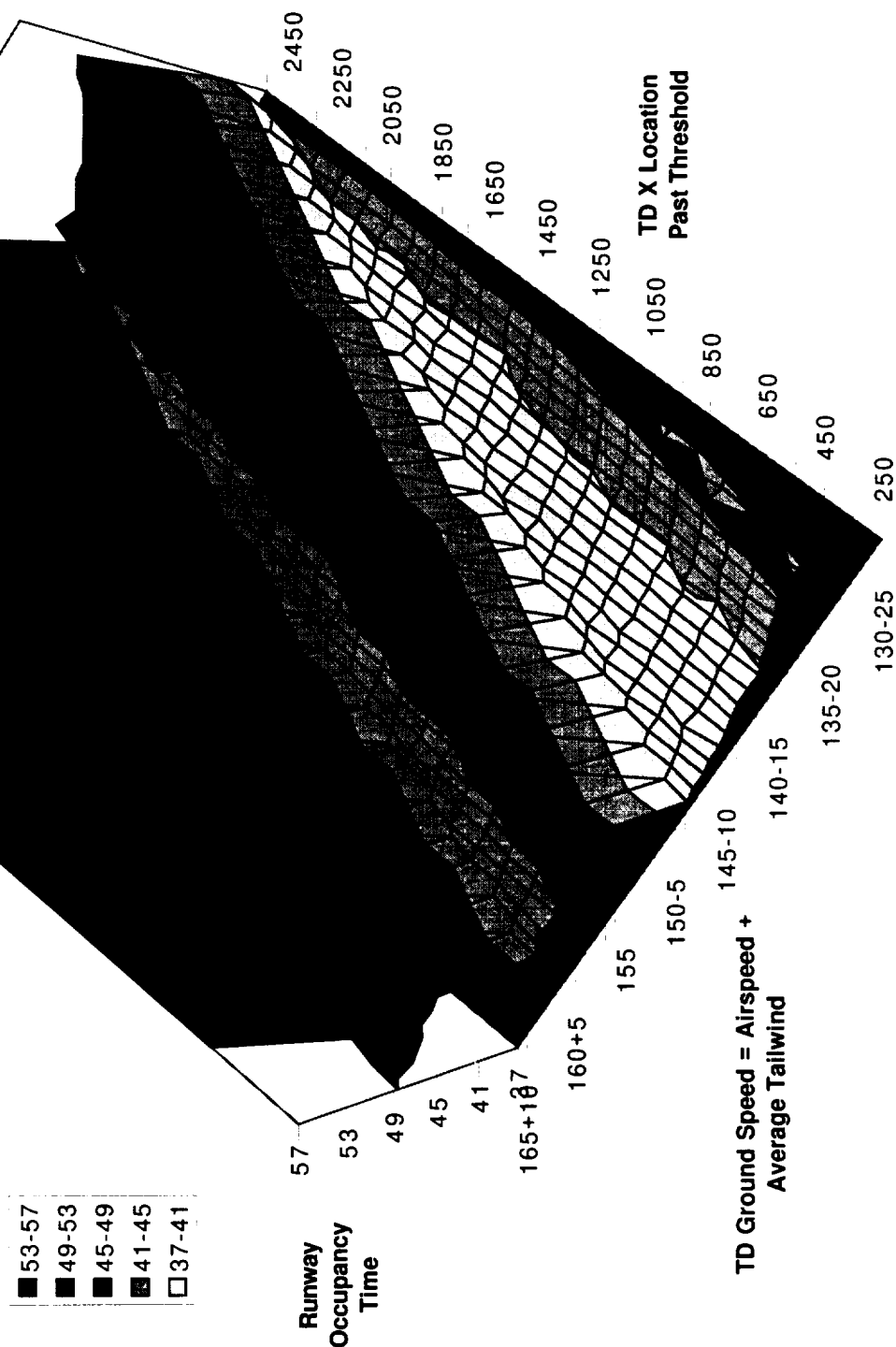
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

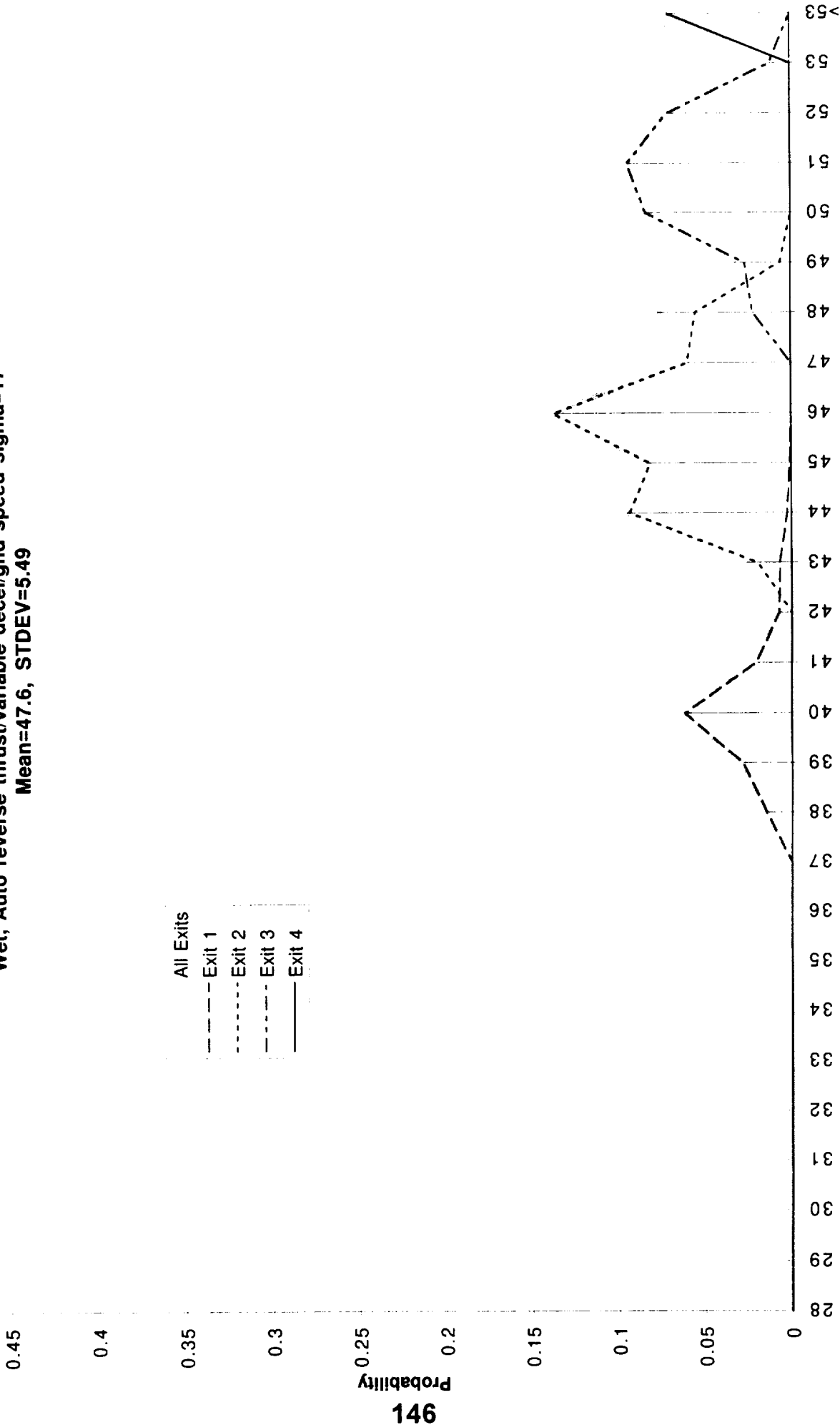
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/gnd speed sigma=17
Mean=47.6, STDEV=5.49



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

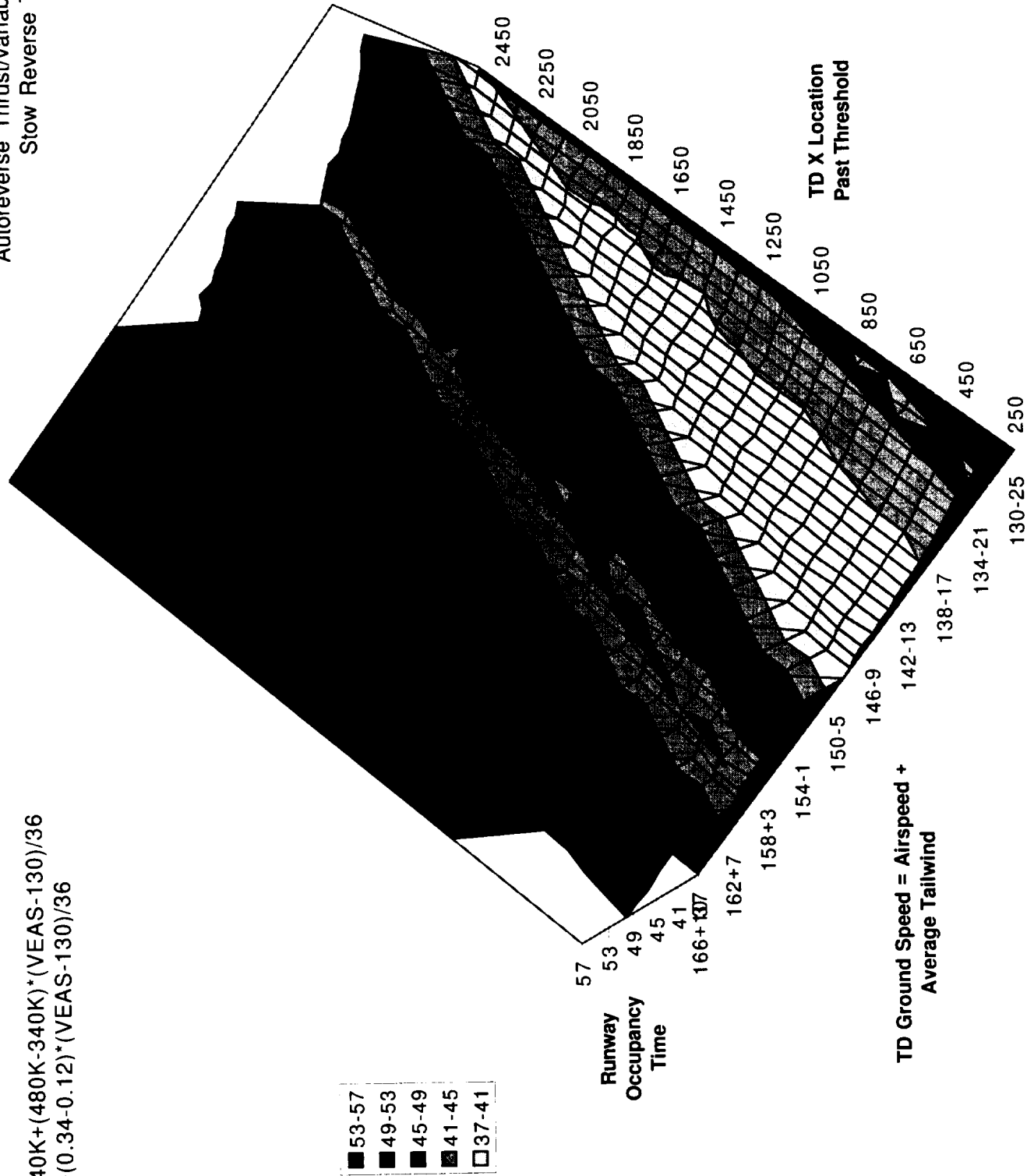
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

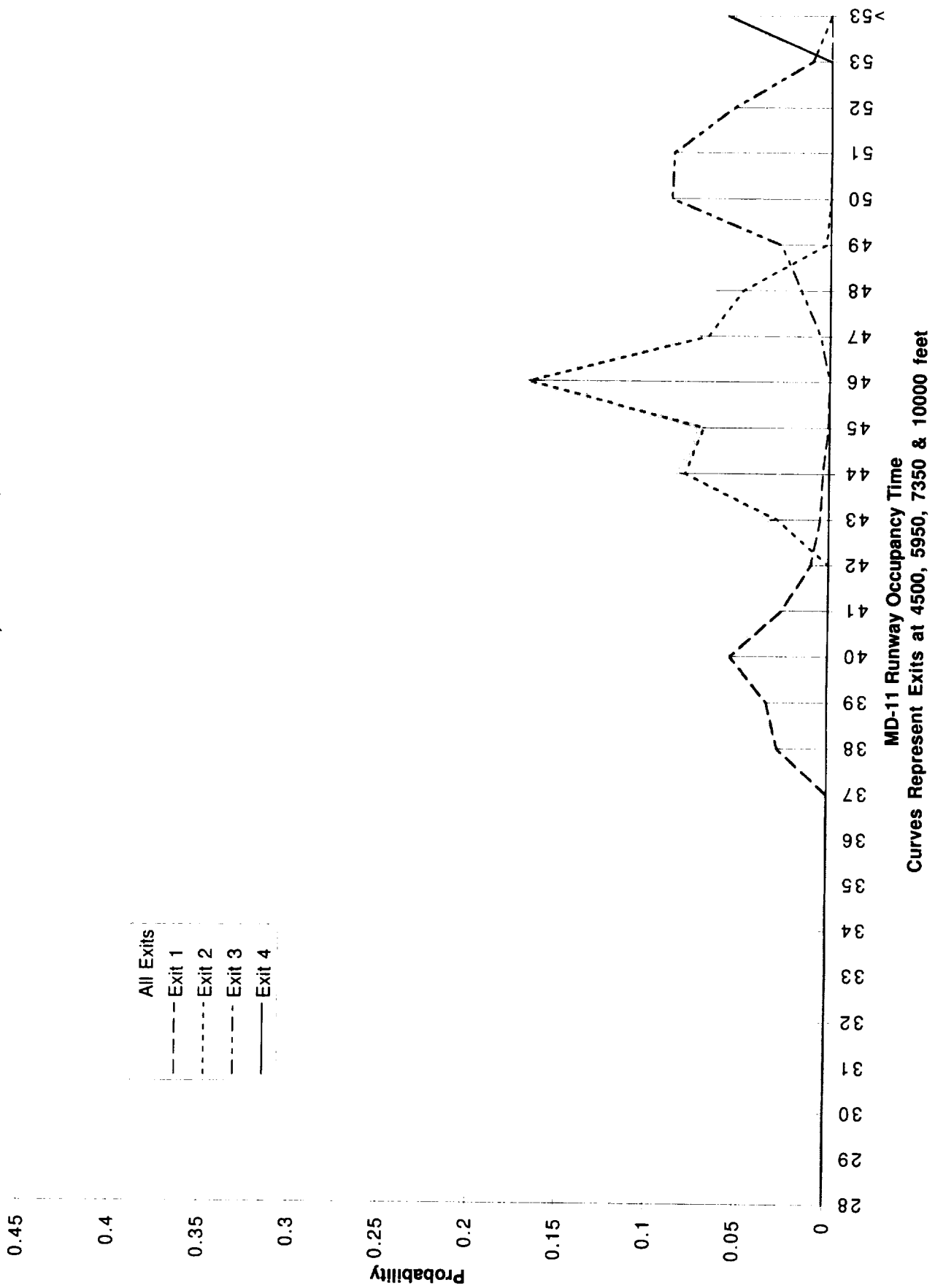
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500,5950,7350,10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/gnd speed sigma=17
 Mean=47.1, STDEV=5.302



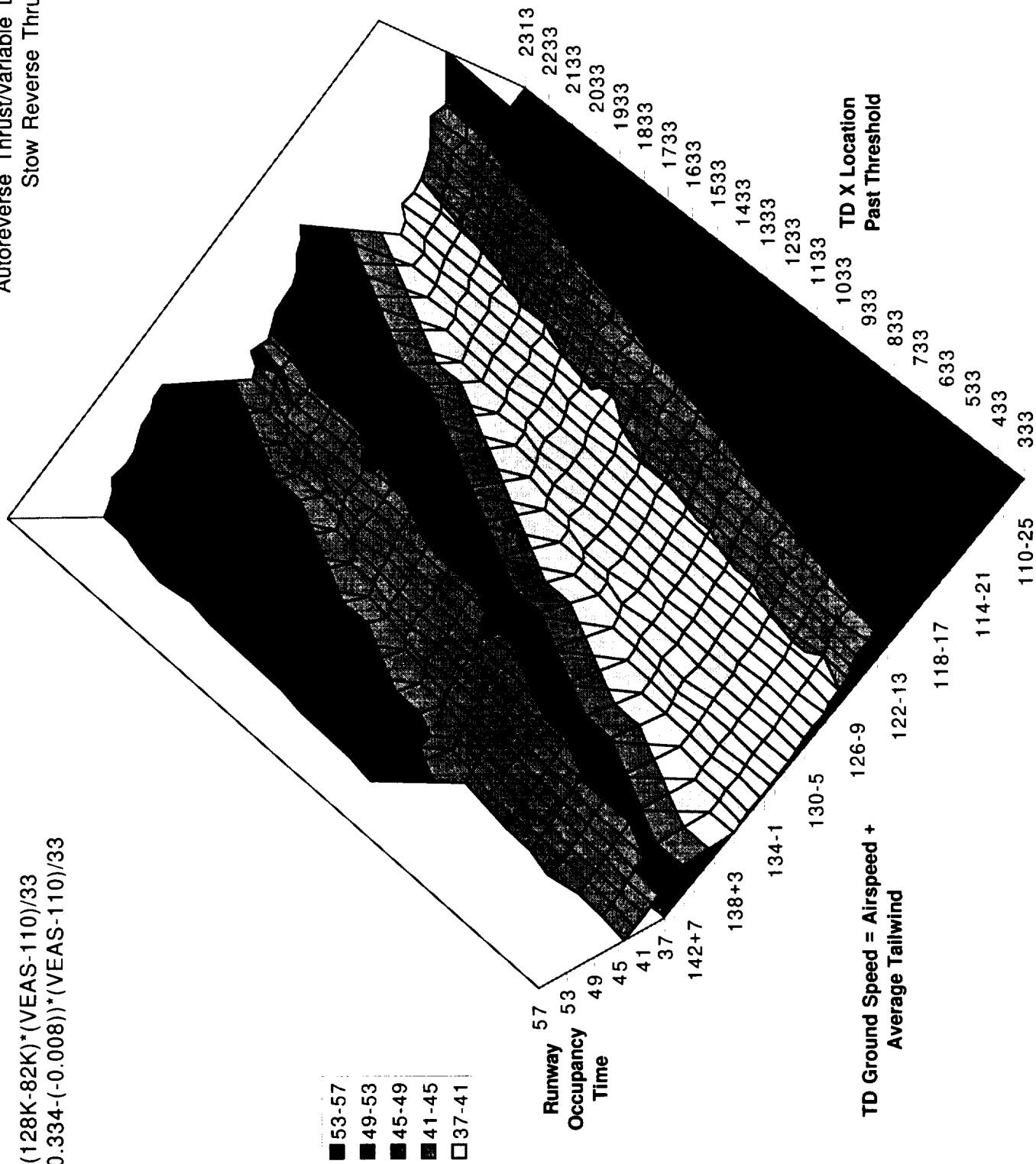
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

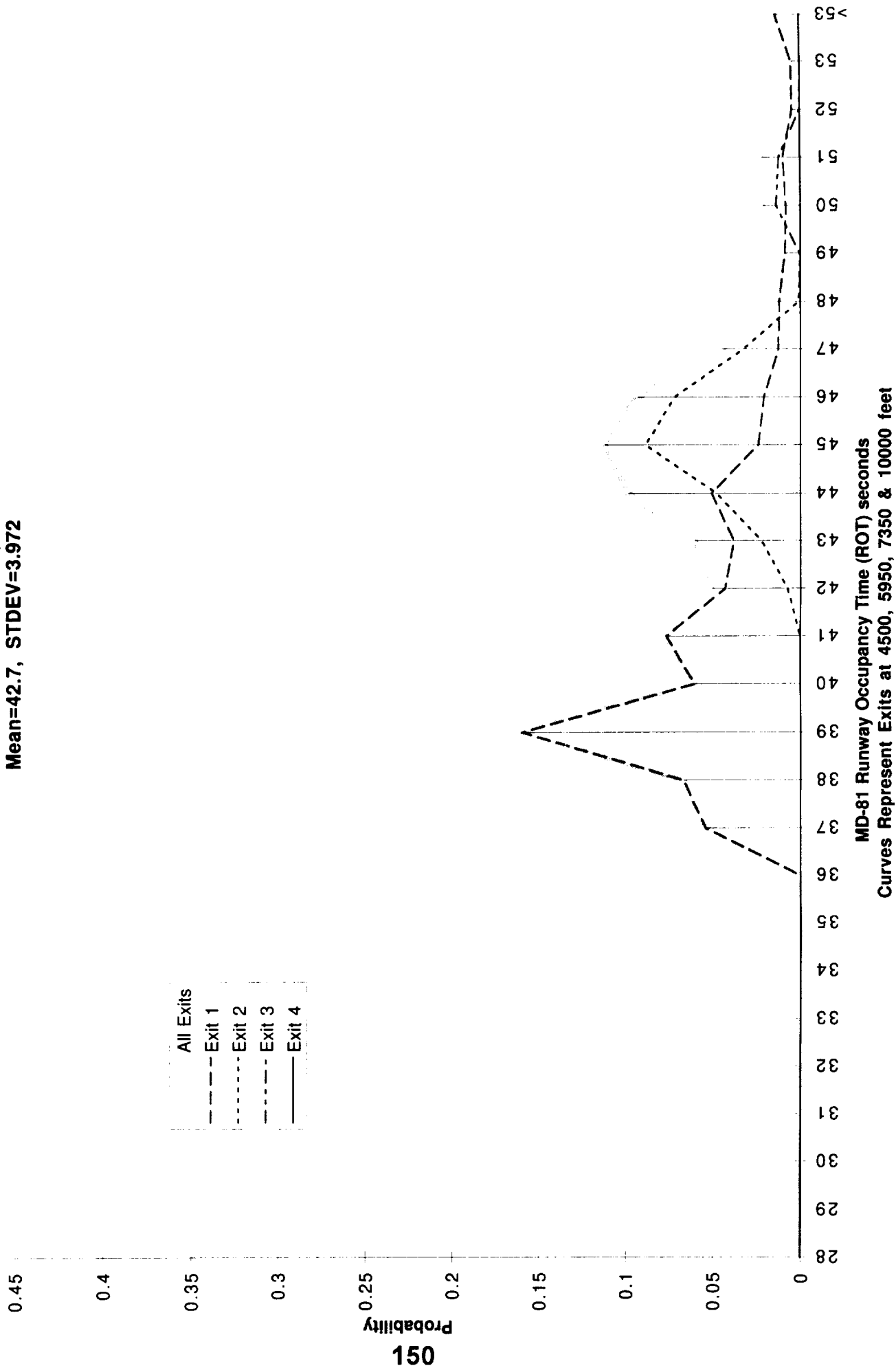
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/gnd speed sigma=17
Mean=42.7, STDEV=3.972



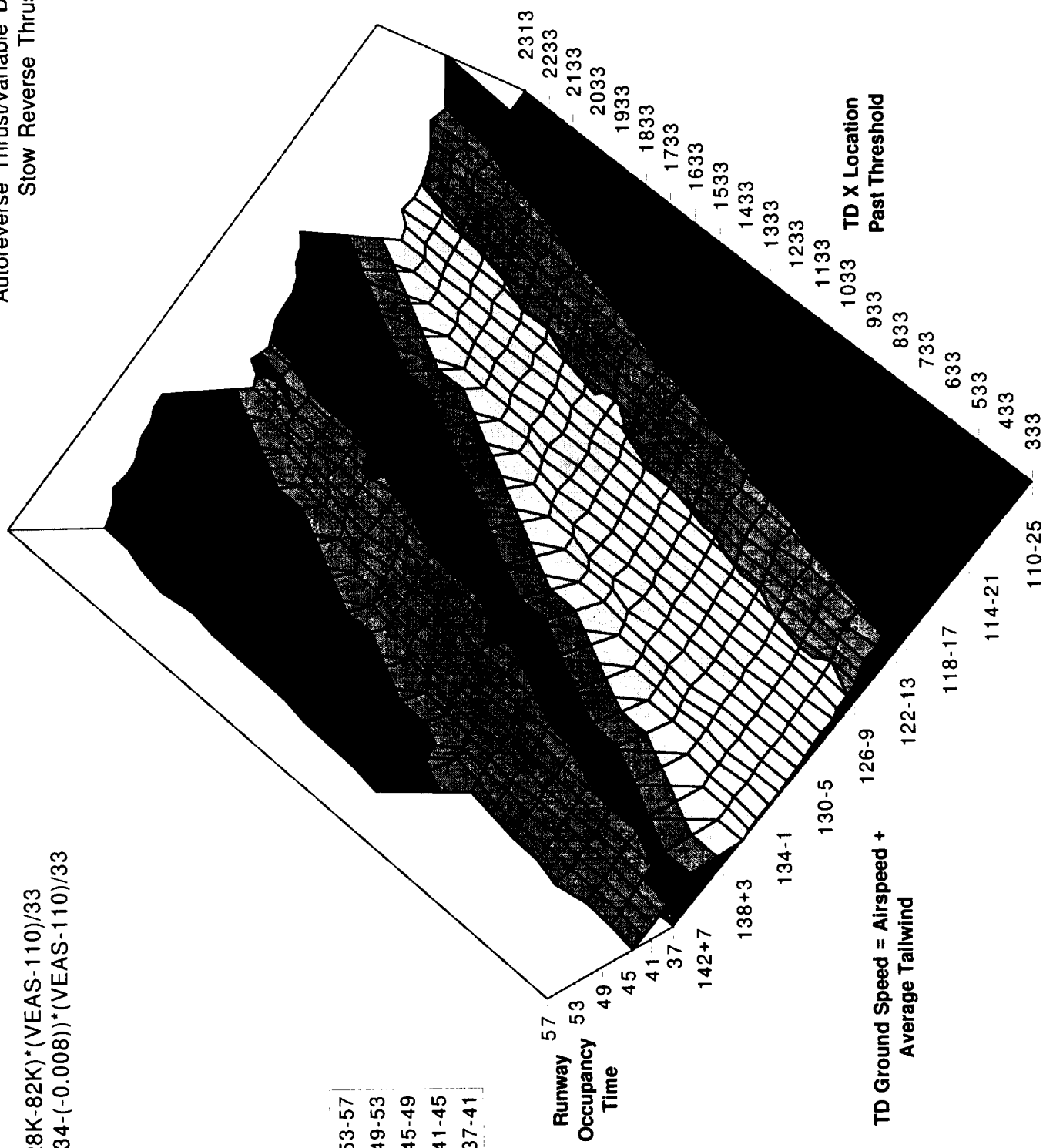
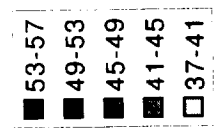
Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

MD-81 ROTO Occupancy Time

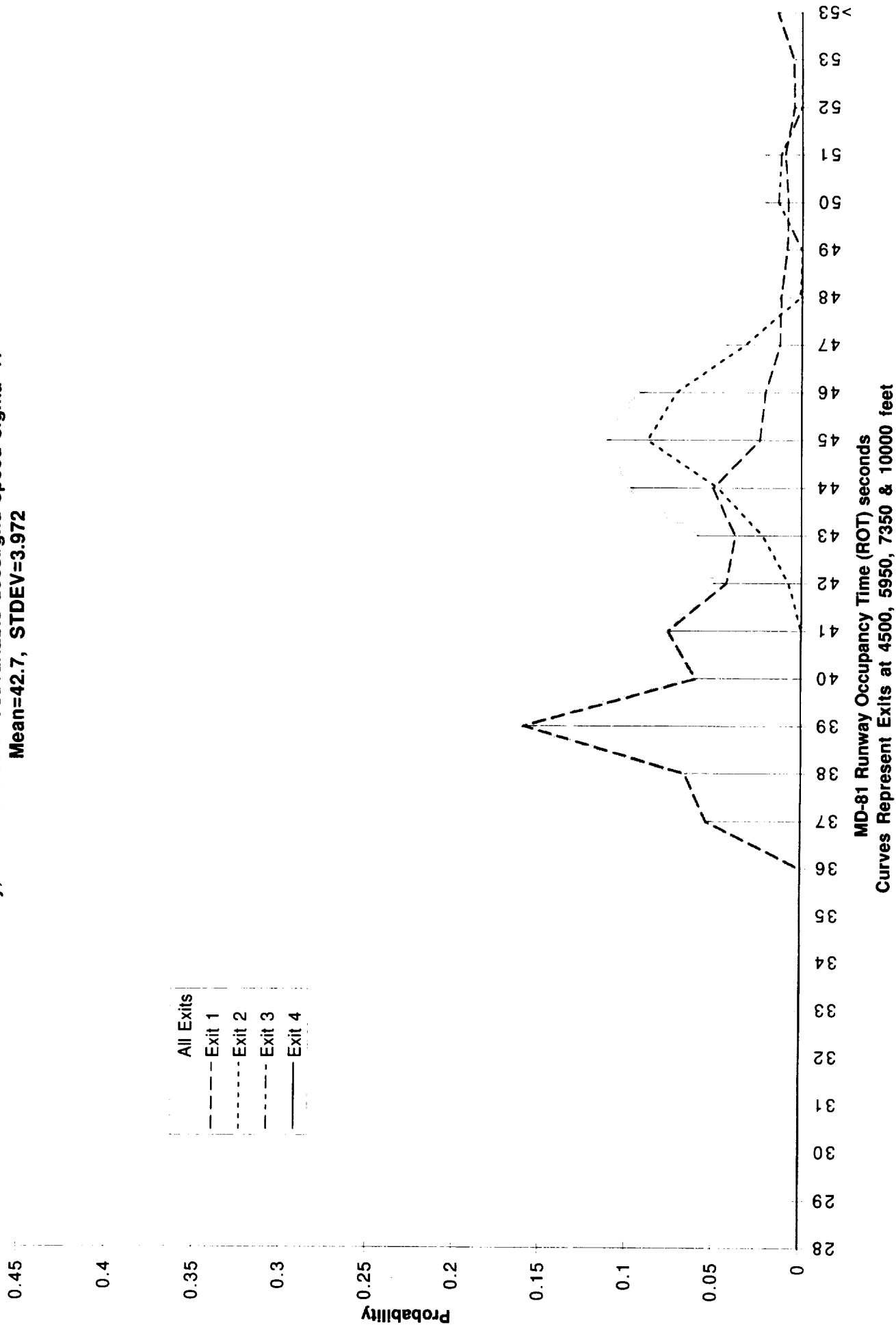
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$



MD-81 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/gnd speed sigma=17
 Mean=42.7, STDEV=3.972



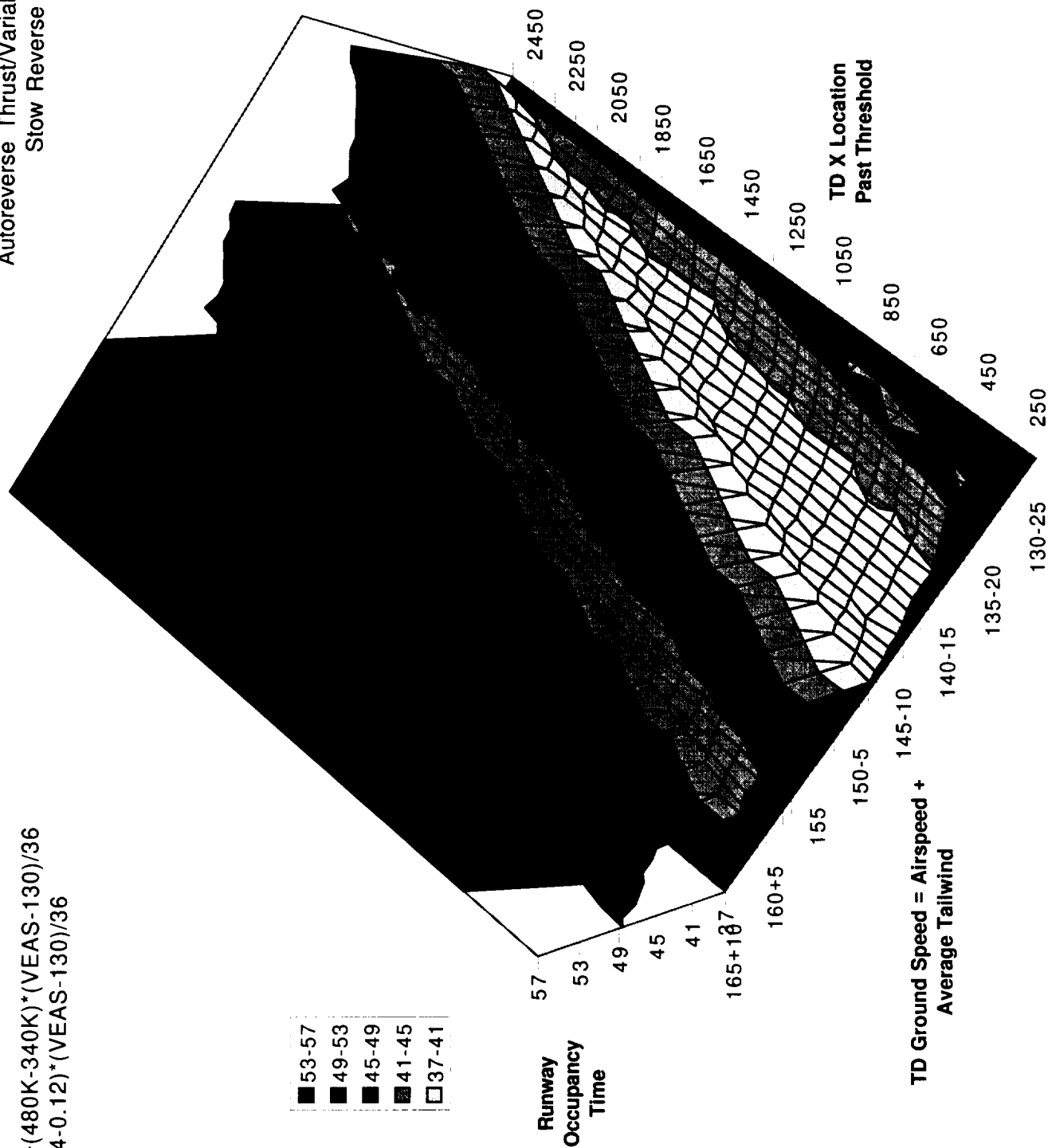
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

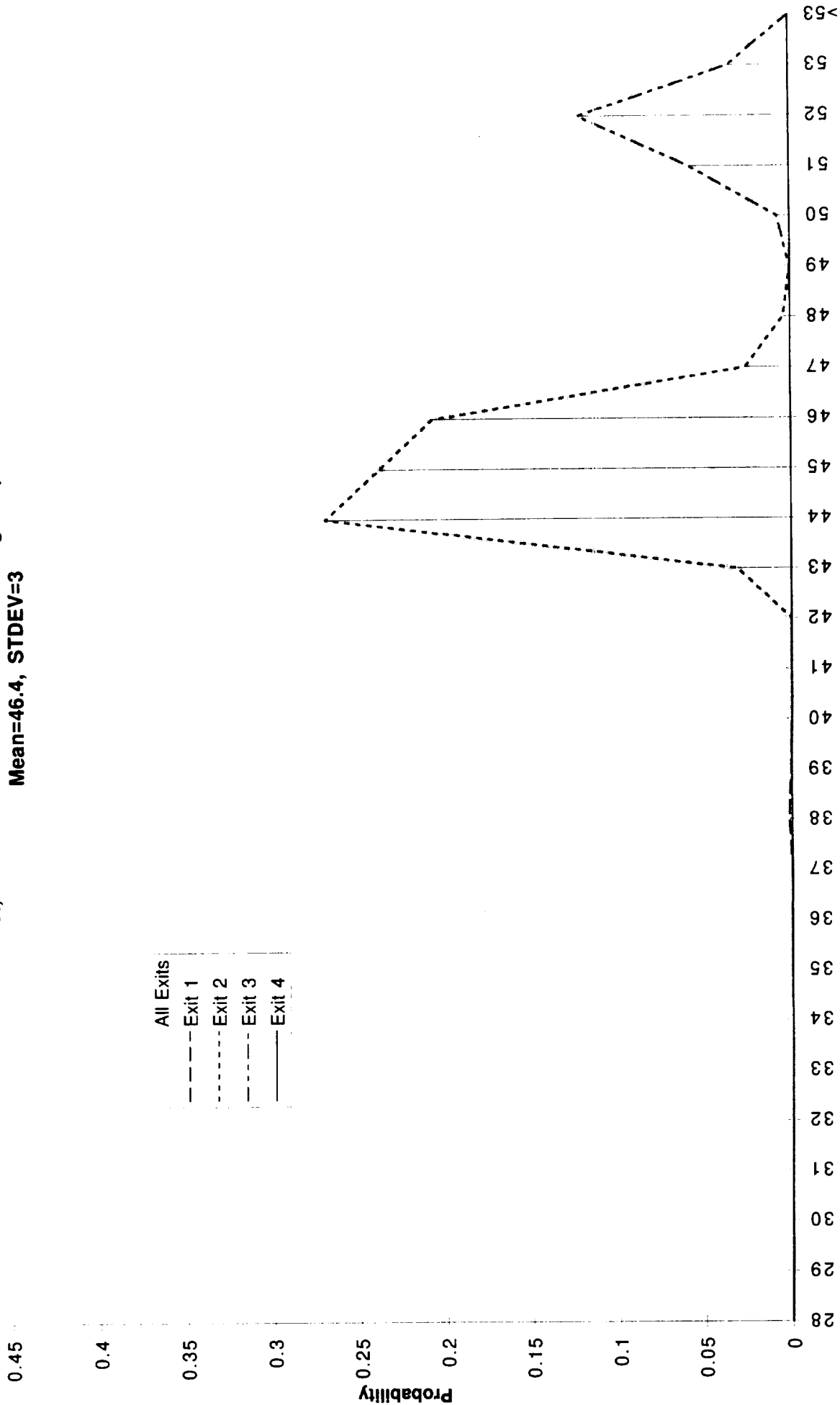
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/gnd speed=5
Mean=46.4, STDEV=3



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

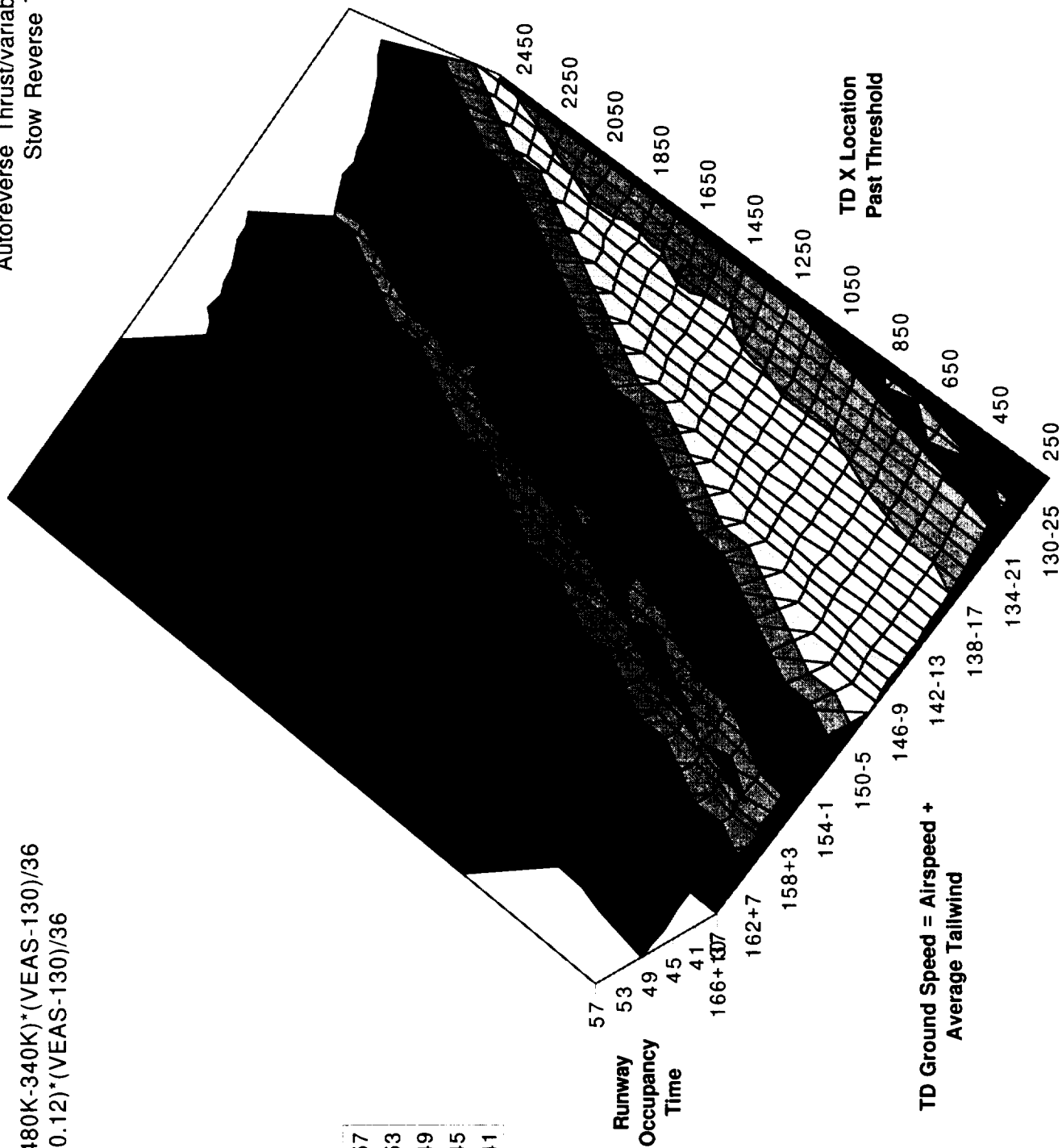
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

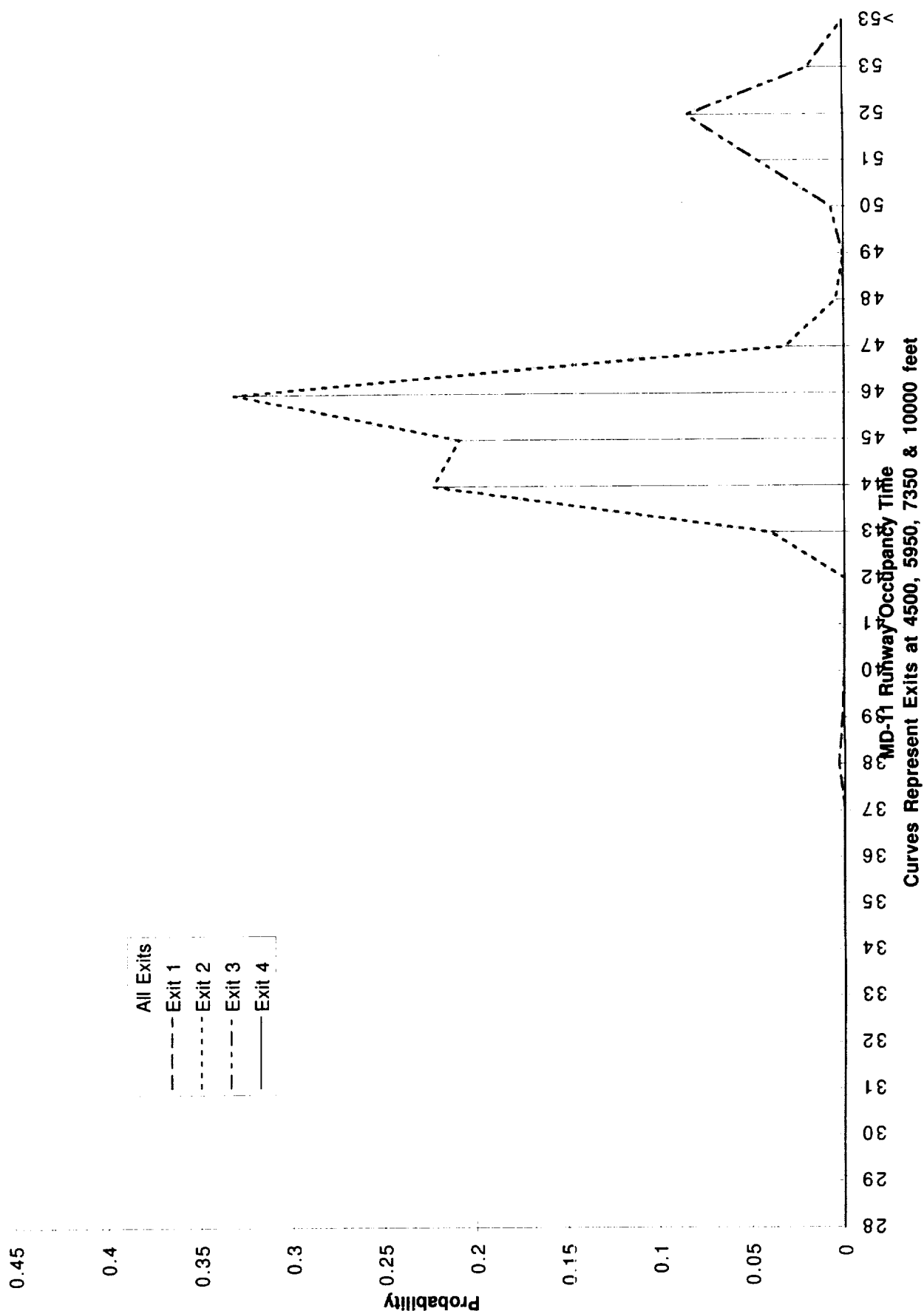
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
 Dry, Auto reverse thrust/variable decel/gnd speed sigma=5
 Mean=46.1, STDEV=2.629

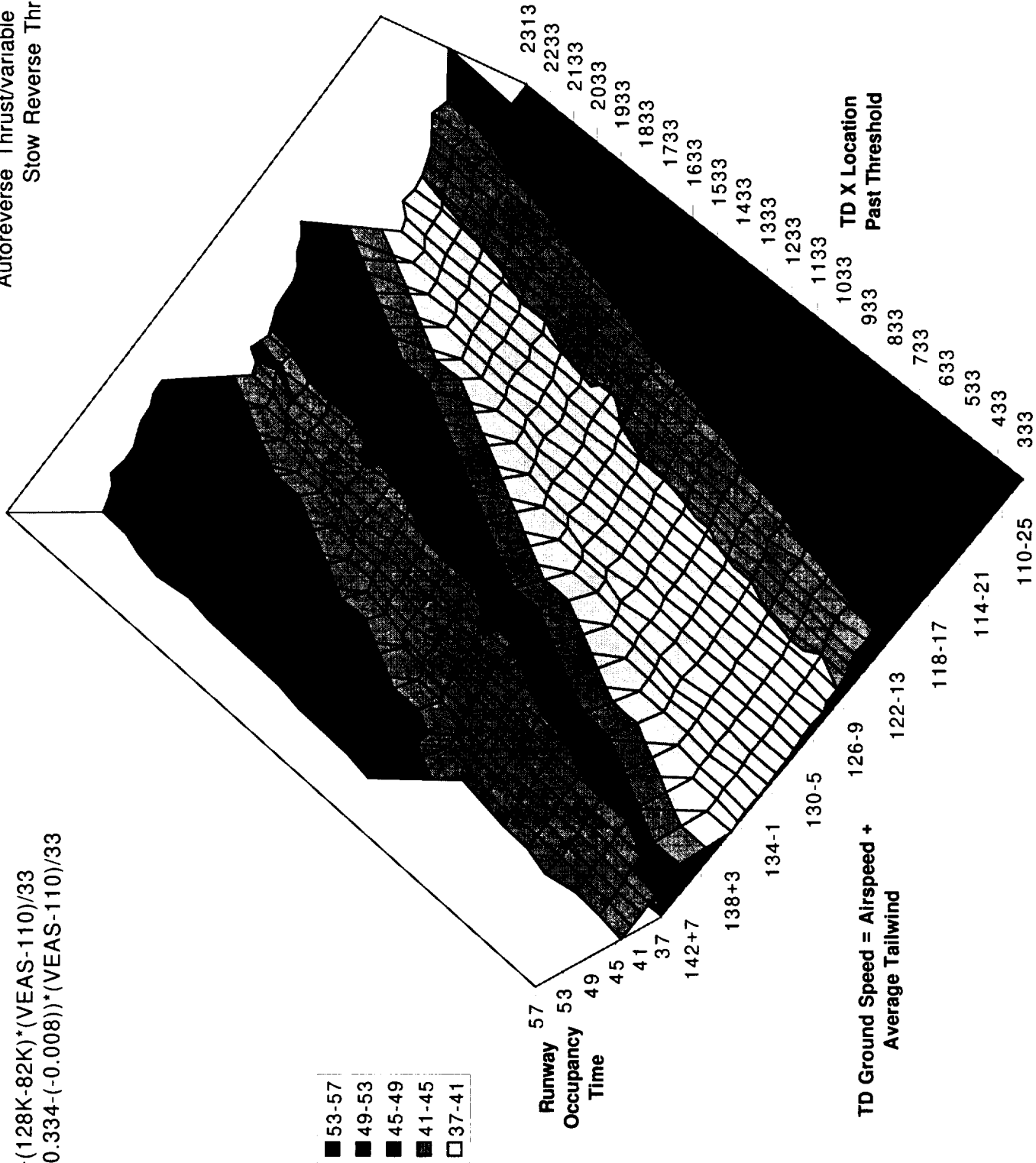


Predict exit prior to TD

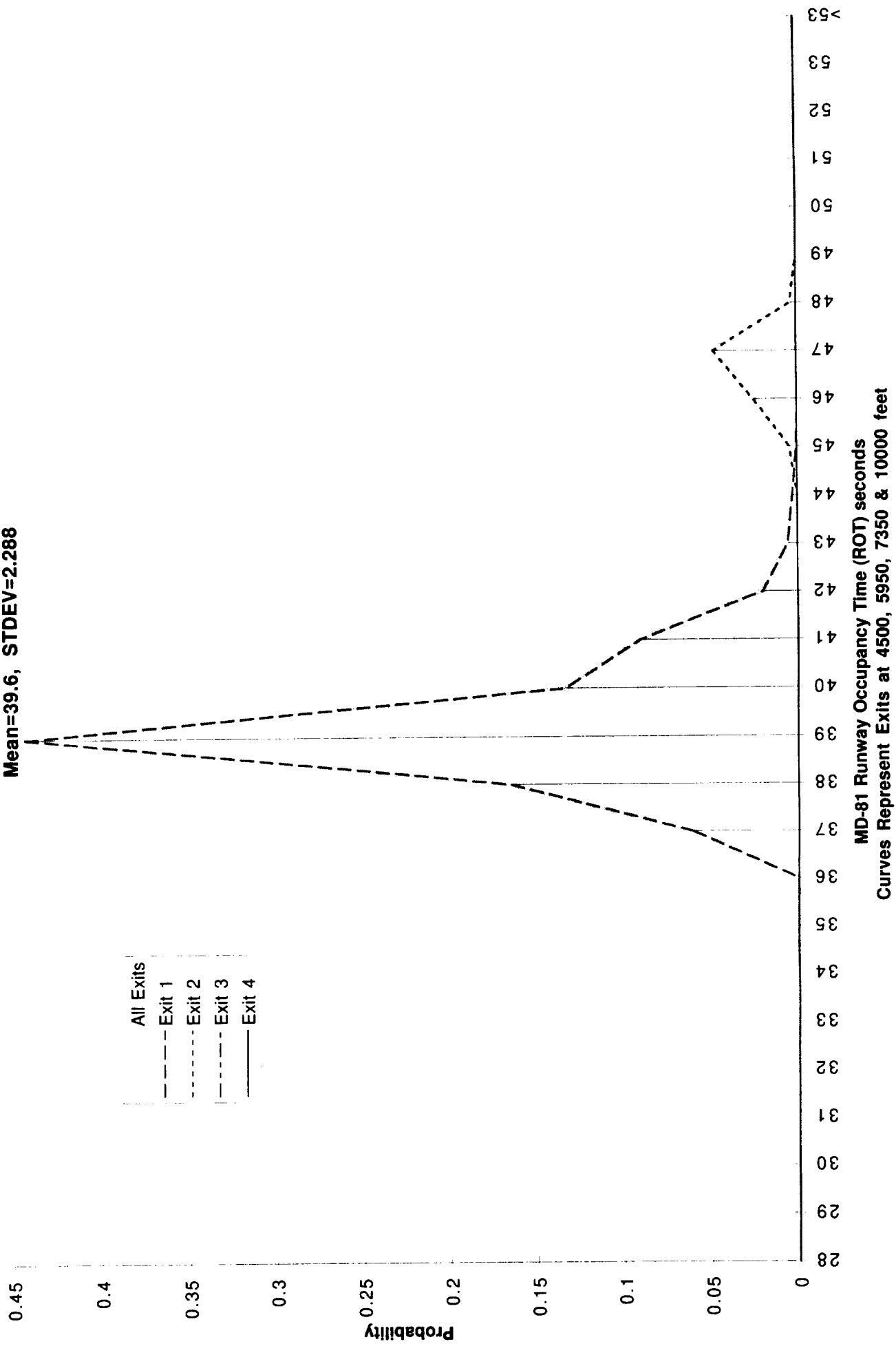
$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/gnd speed sigma=5
Mean=39.6, STDEV=2.288



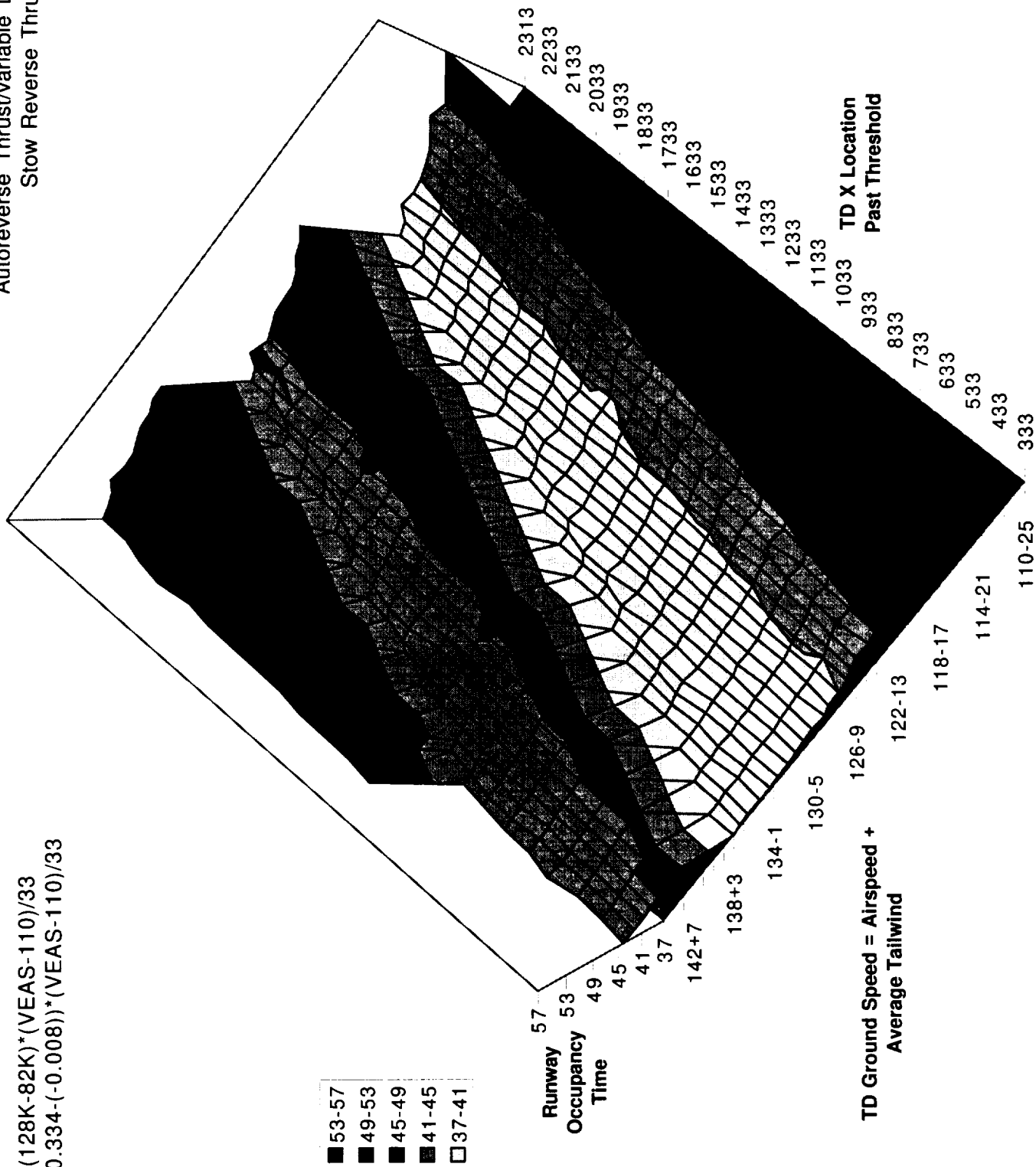
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

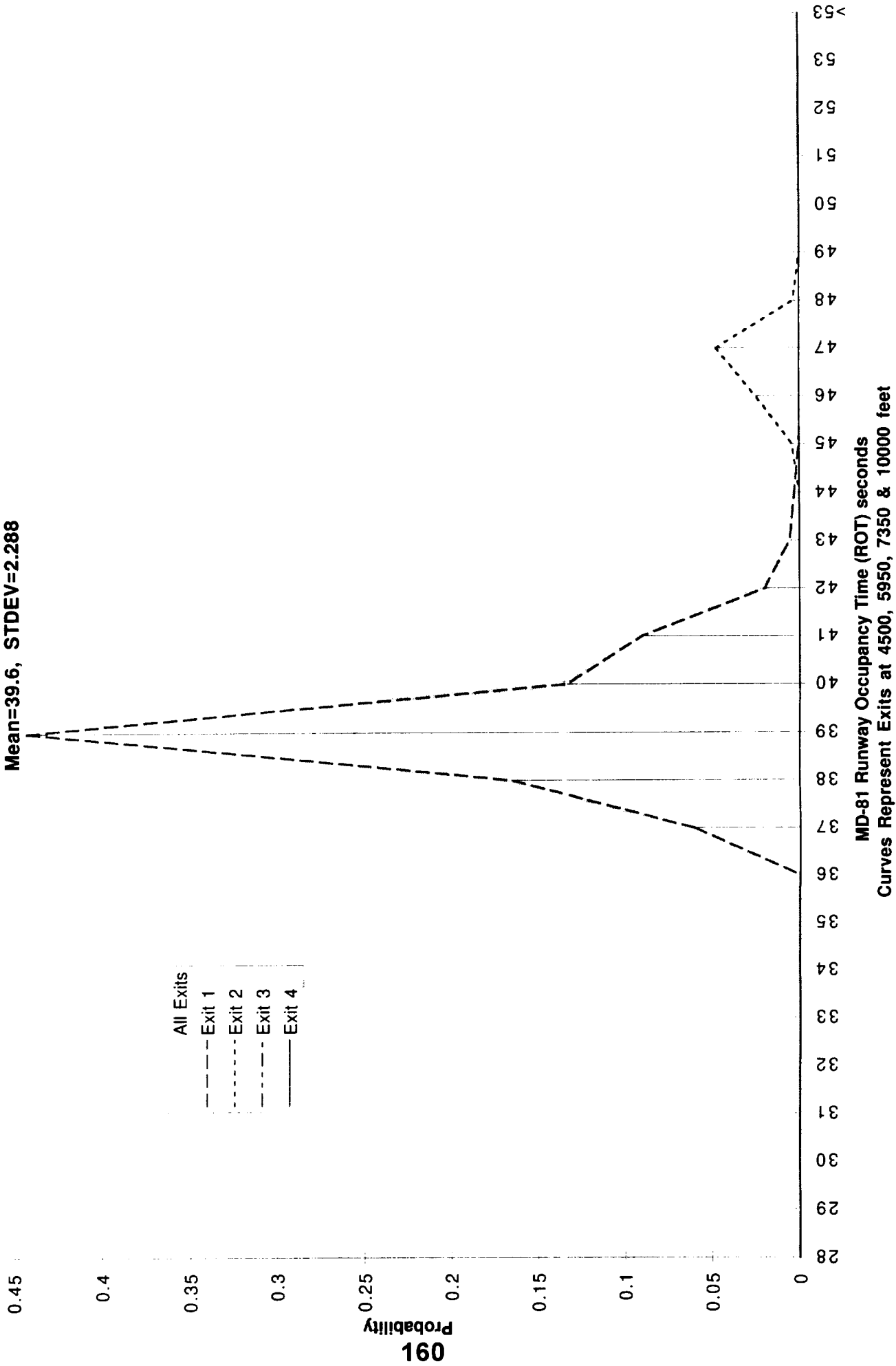
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Dry, Auto reverse thrust/variable decel/gnd speed sigma=5
Mean=39.6, STDEV=2.288



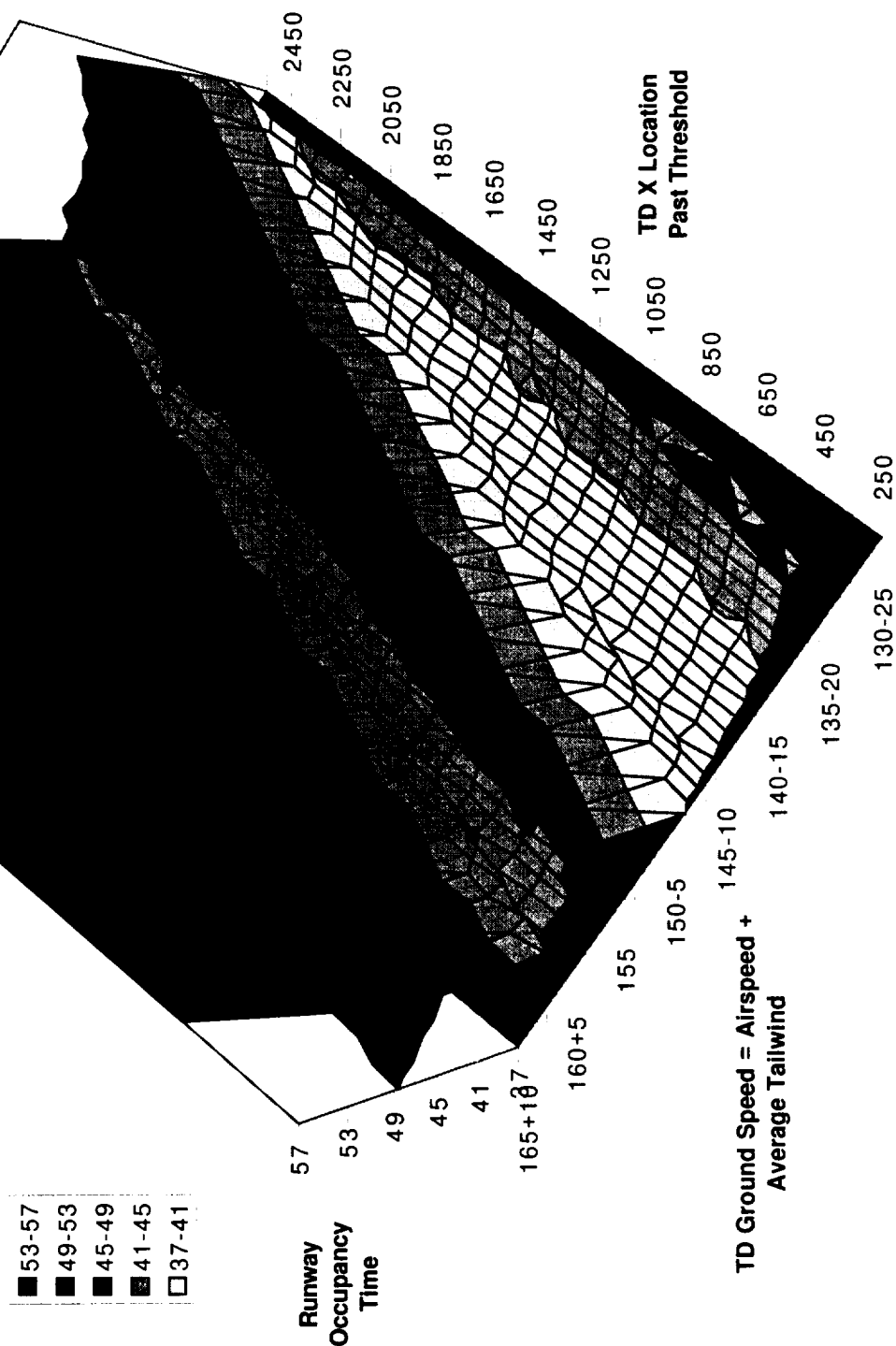
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

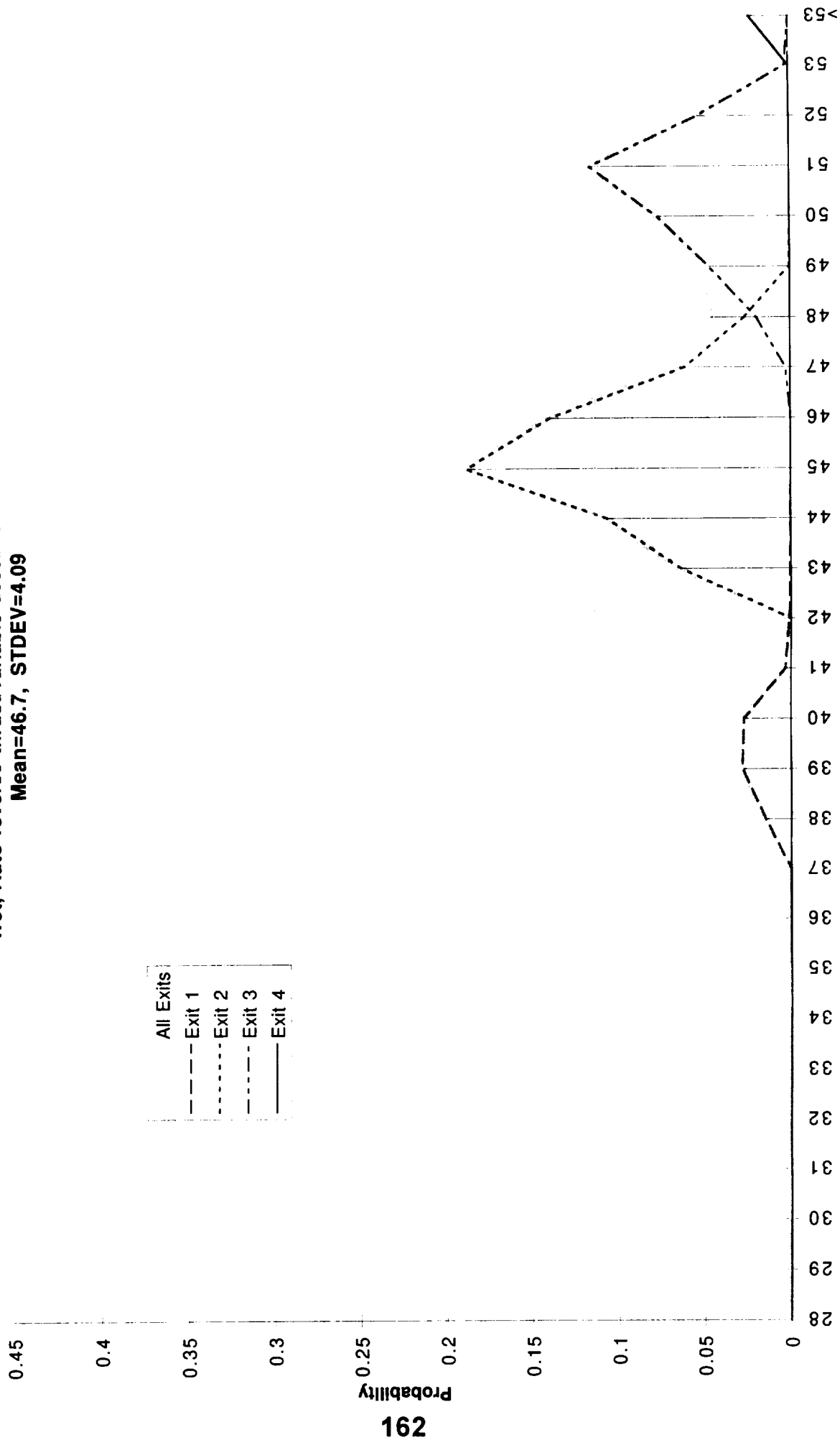
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
NO crosswind
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/no crosswind
Mean=46.7, STDEV=4.09



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

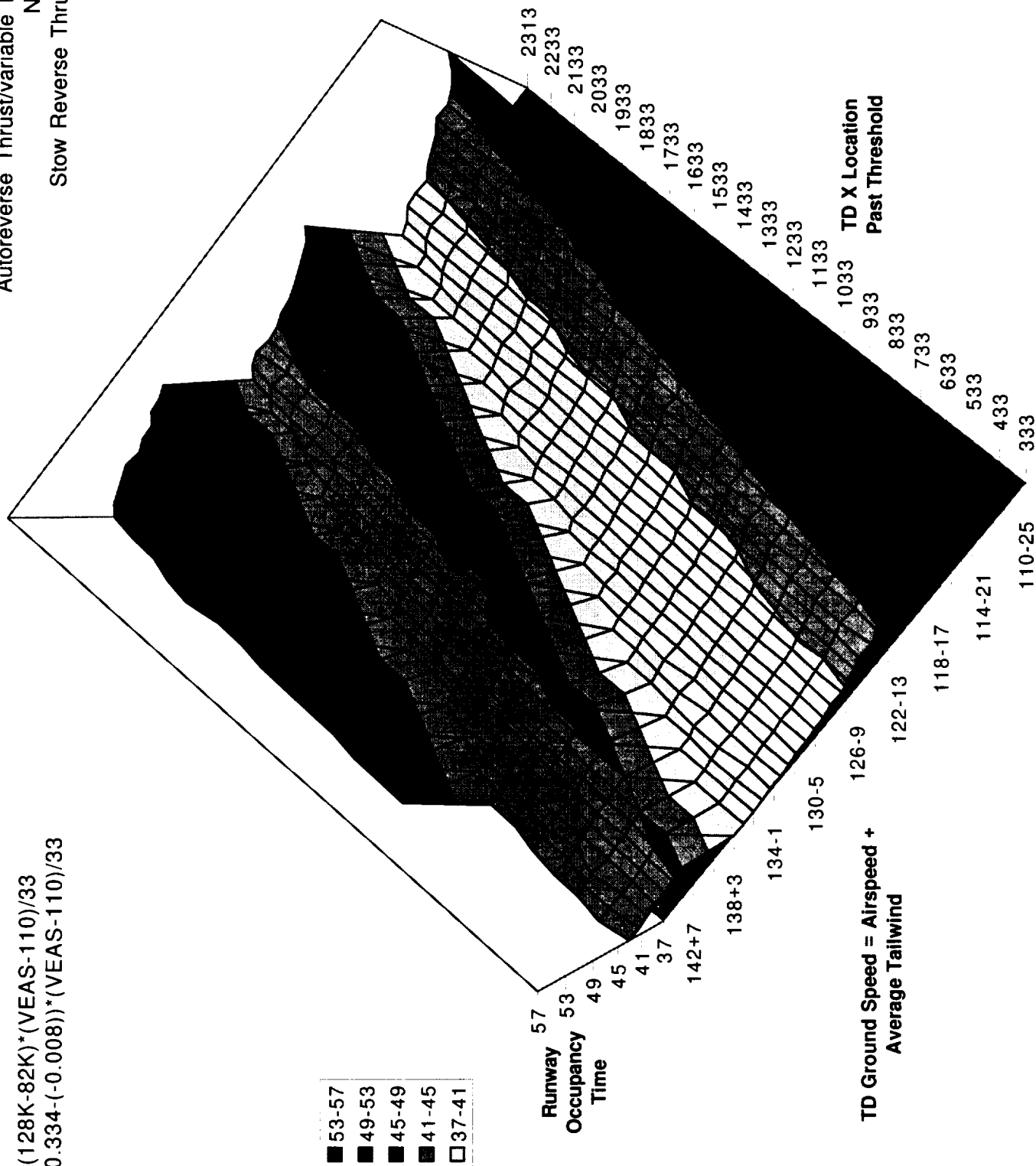
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

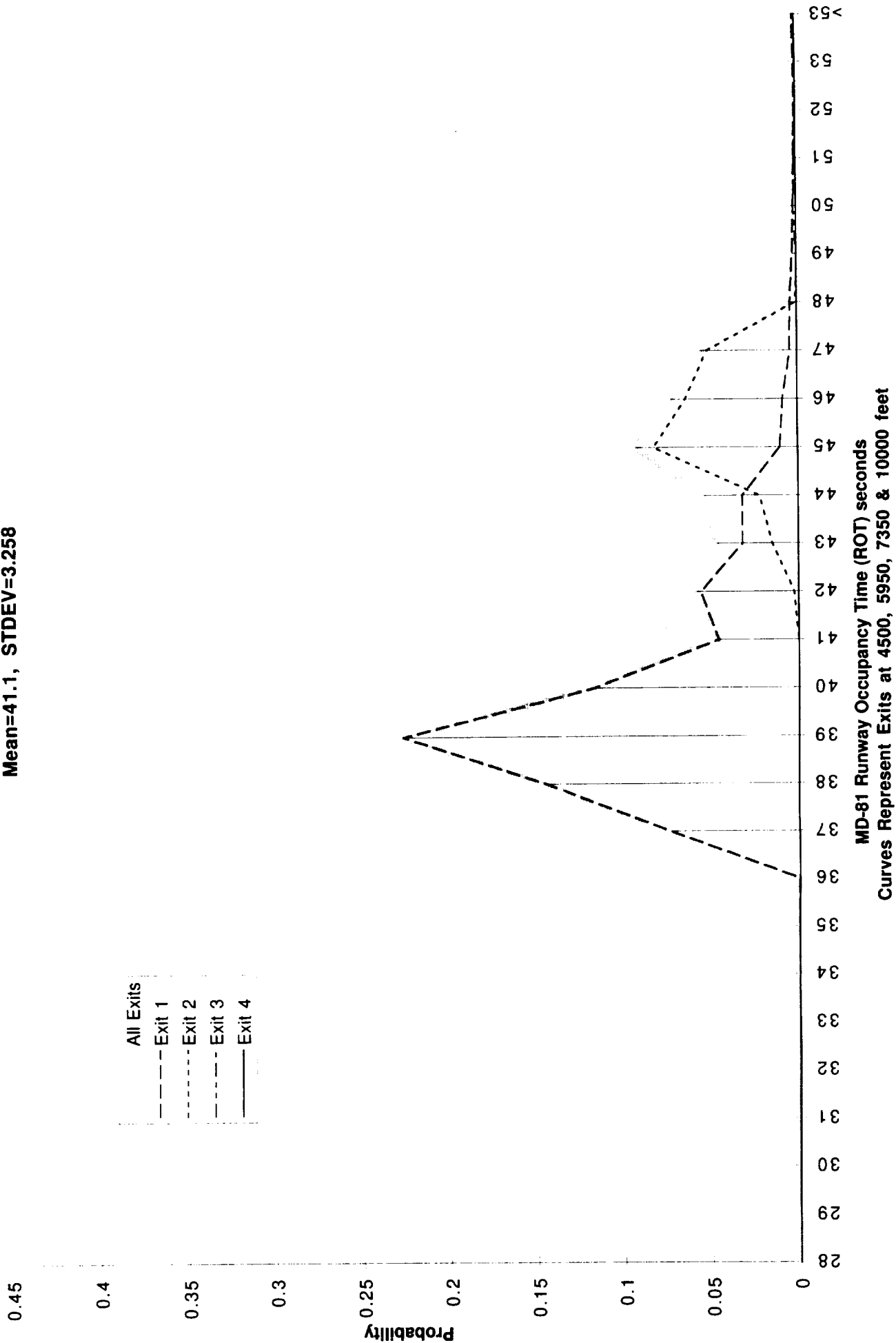
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
NO crosswind
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/no crosswind
Mean=41.1, STDEV=3.258



Wet, Exits=4500, 5950, 7350, 10000
 Autoreverse Thrust/Variable Deceleration
 Gusting crosswind 12.5kts, sigma=2.5
 Stow Reverse Thrust=70 kt gd

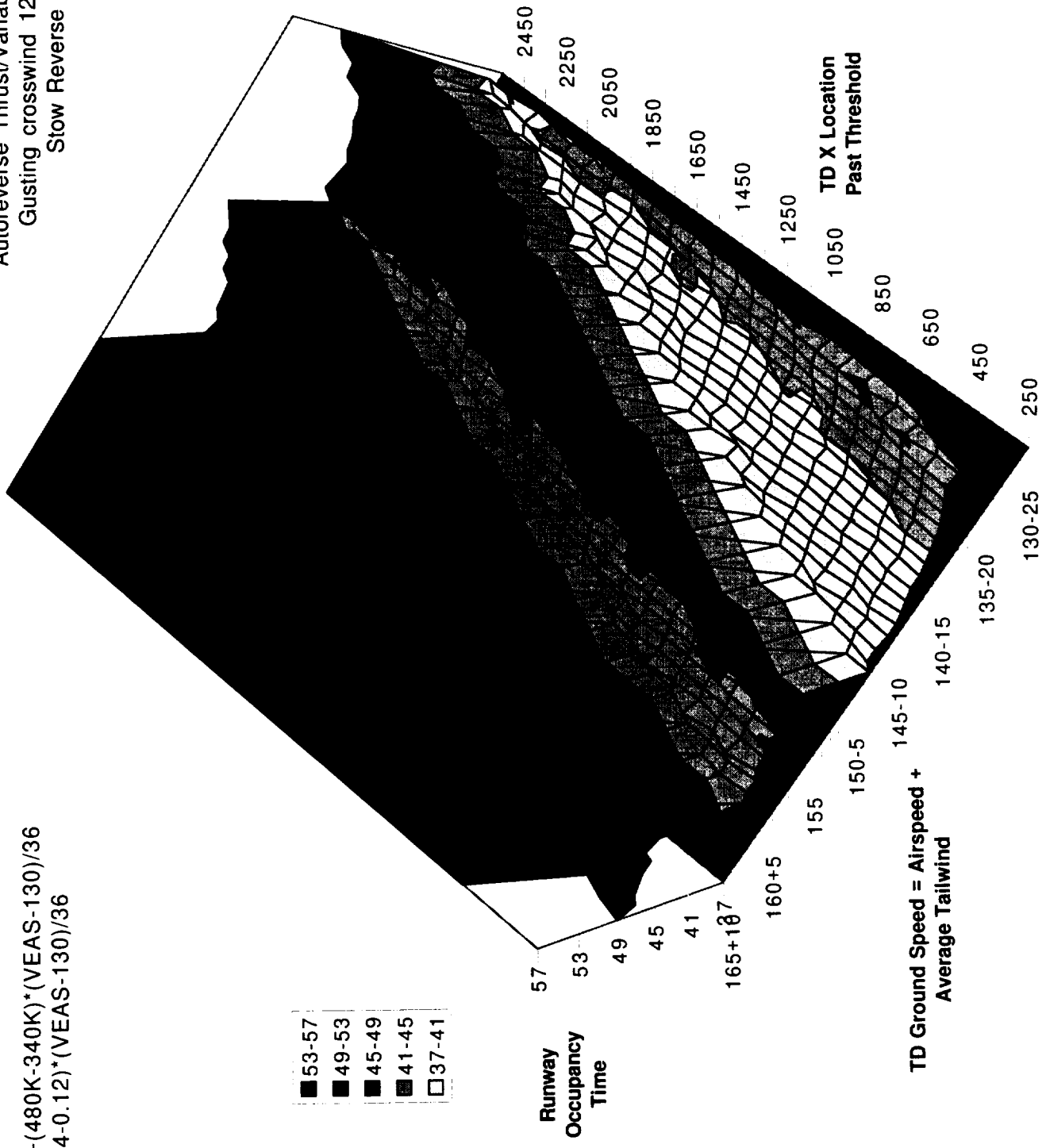
MD-11 ROTO Occupancy Time

Predict exit prior to TD

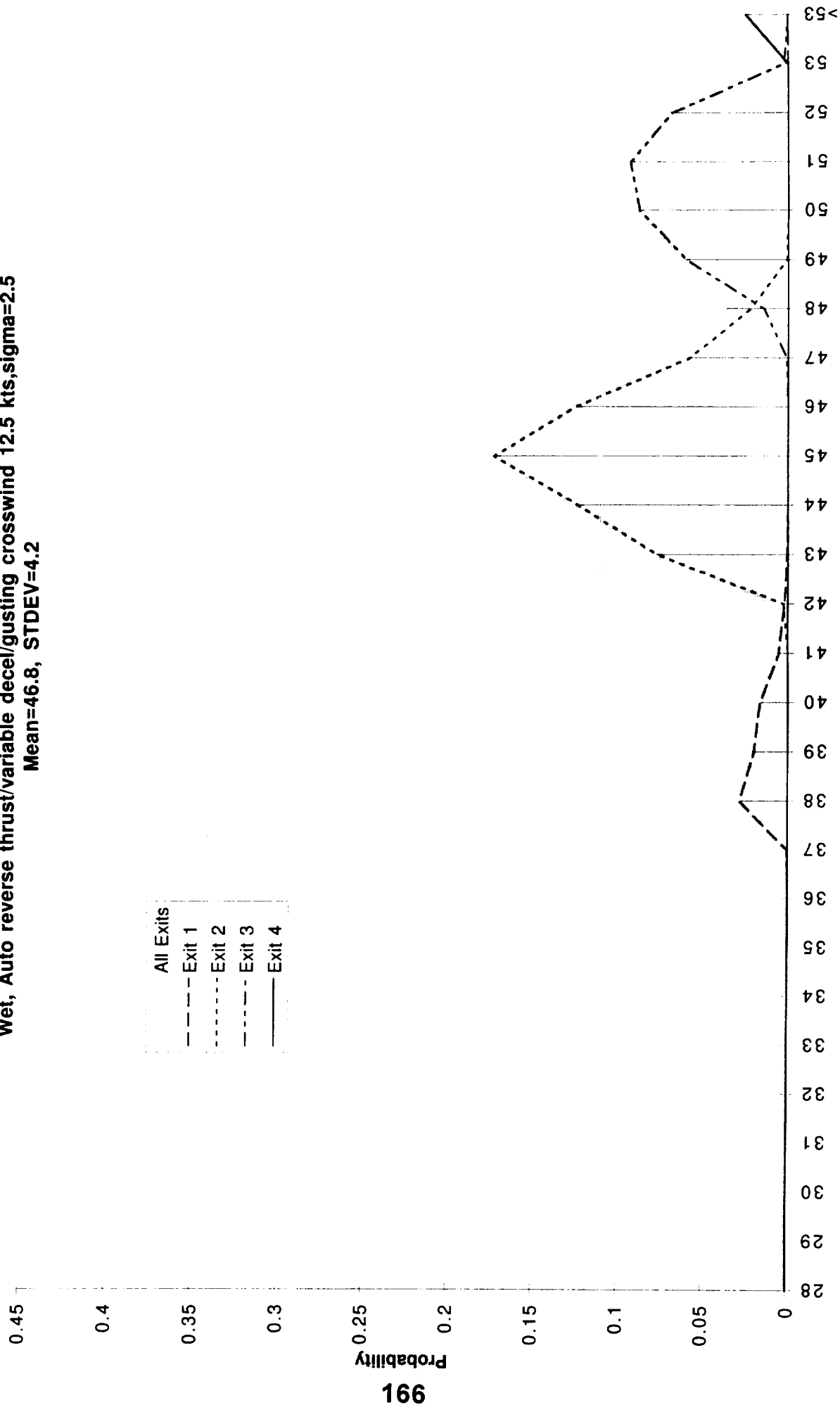
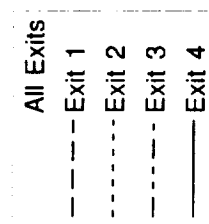
$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/gusting crosswind 12.5 kts,sigma=2.5
Mean=46.8, STDEV=4.2



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

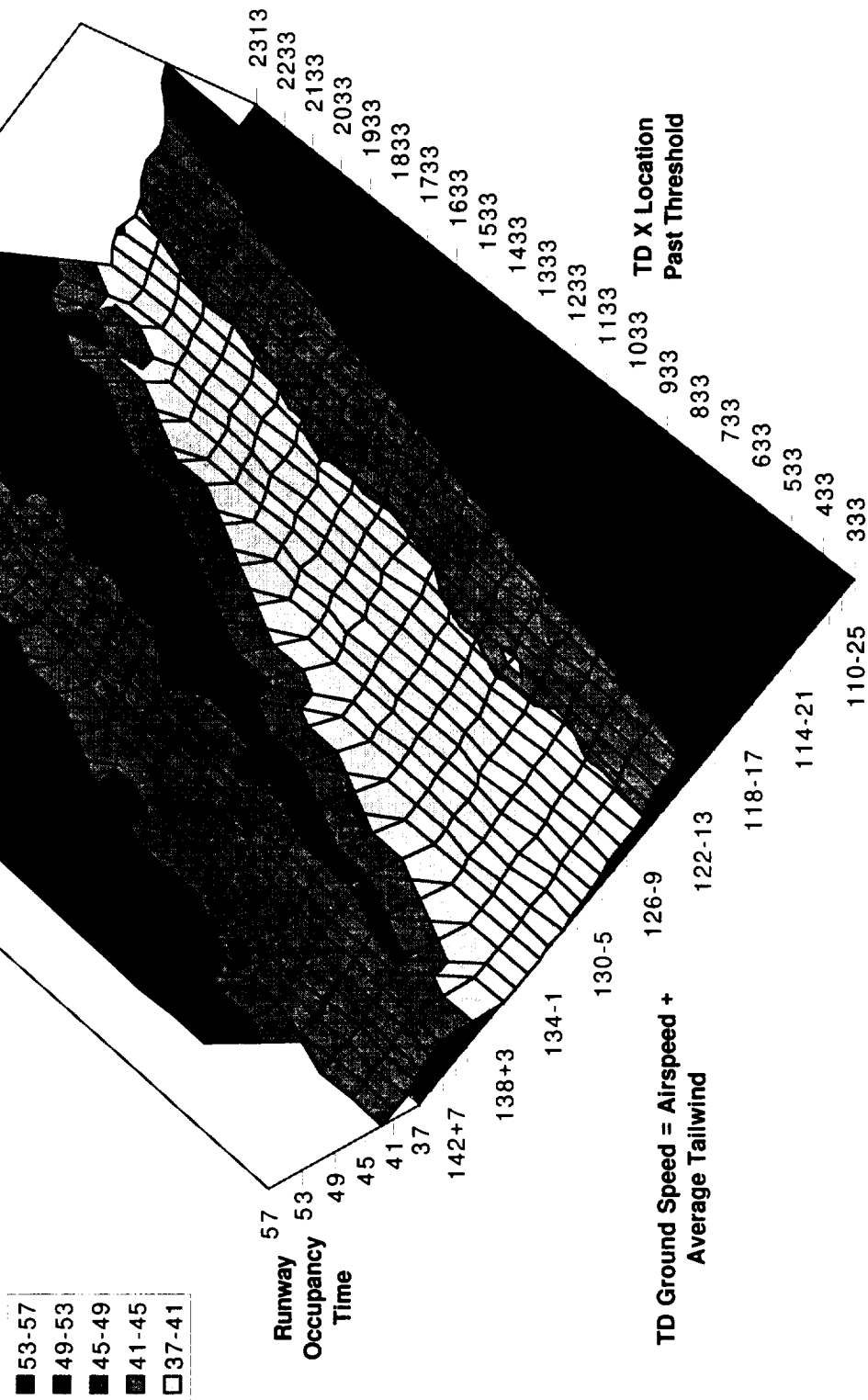
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

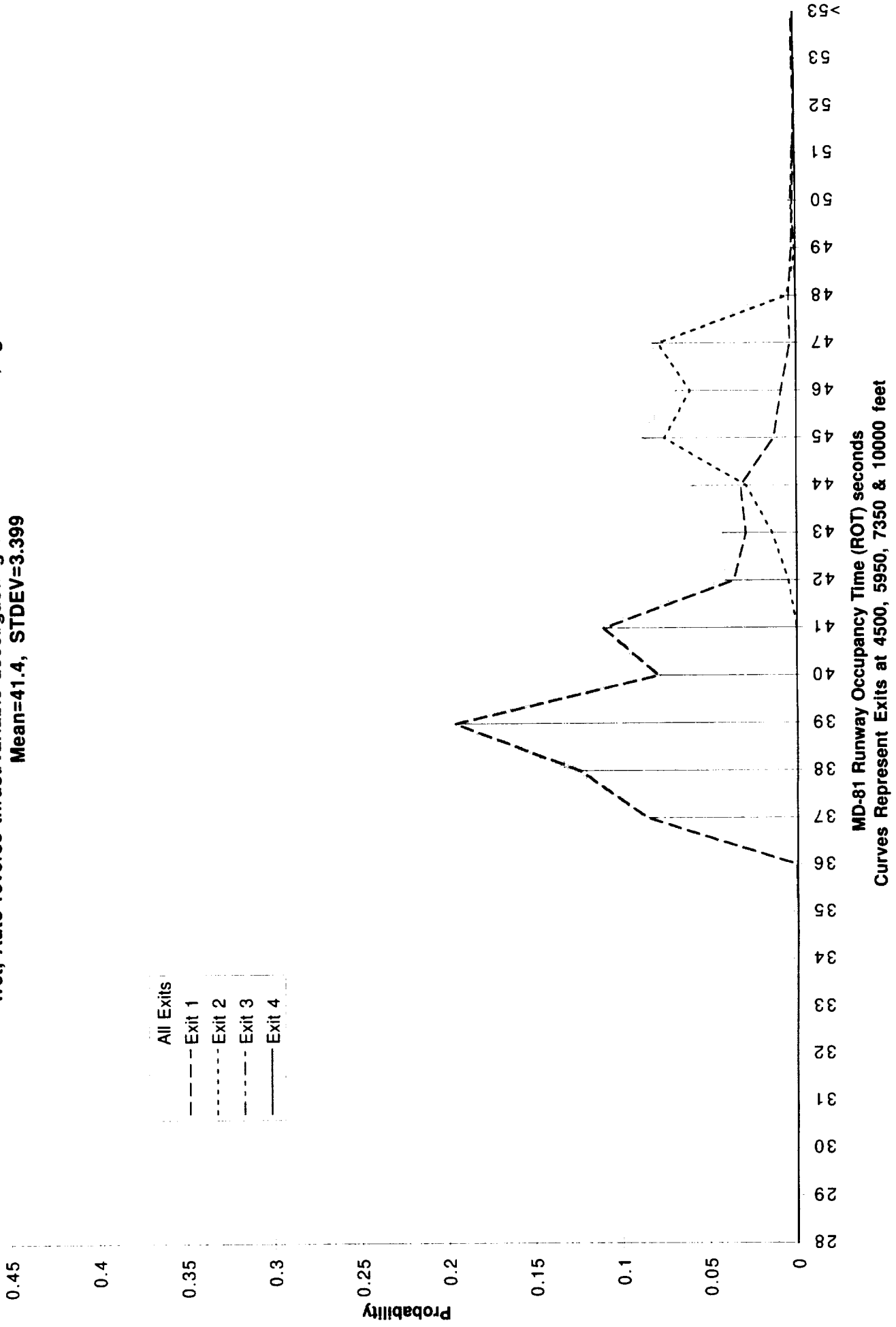
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
 Autoreverse Thrust/variable Deceleration
 Gusting crosswind 12.5kts, sigma=2.5
 Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/gusting crosswind 12.5kts,sigma=2.5
Mean=41.4, STDEV=3.399



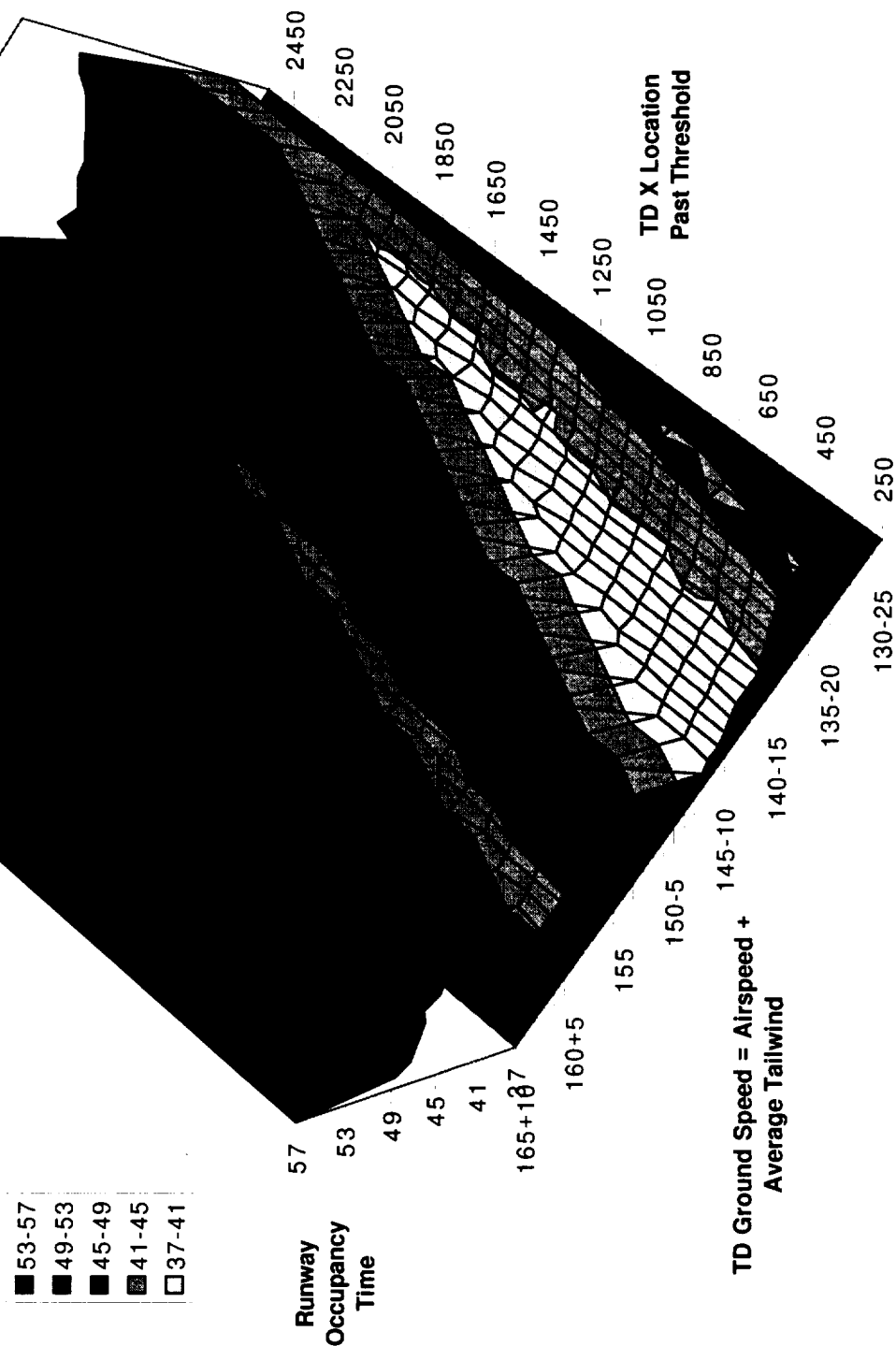
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

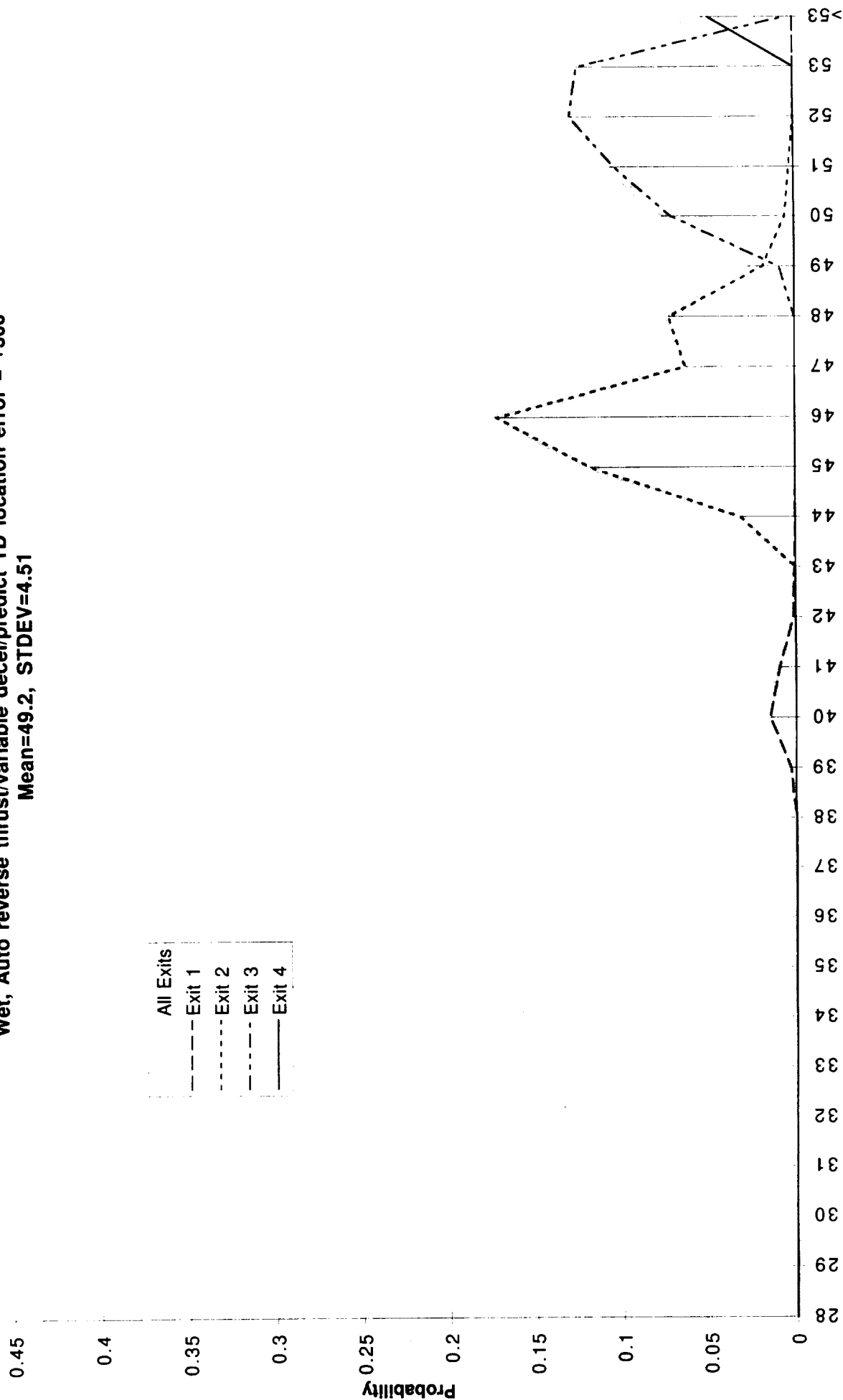
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
predict TD location error = +300
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/predict TD location error = +300
Mean=49.2, STDEV=4.51



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

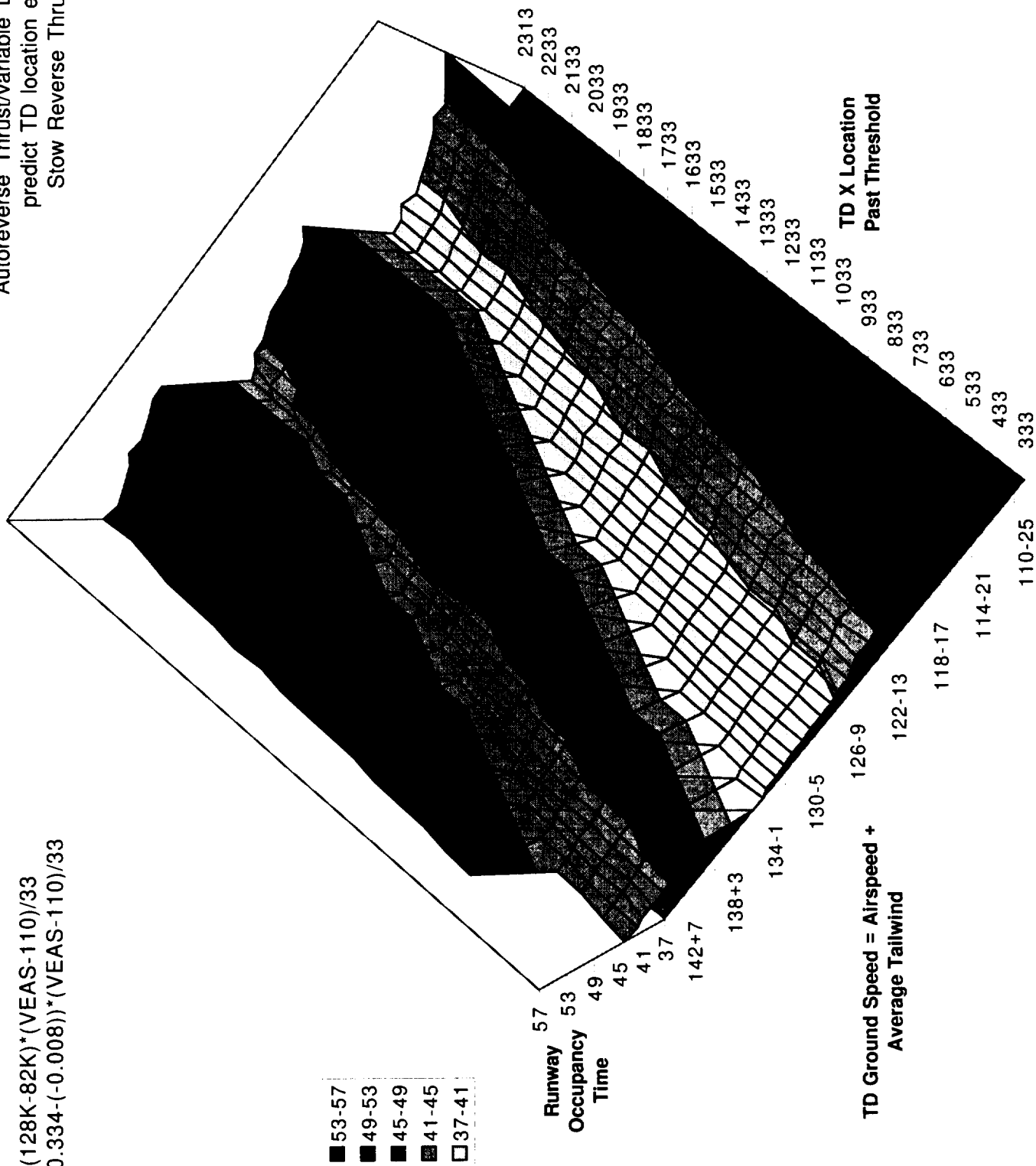
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

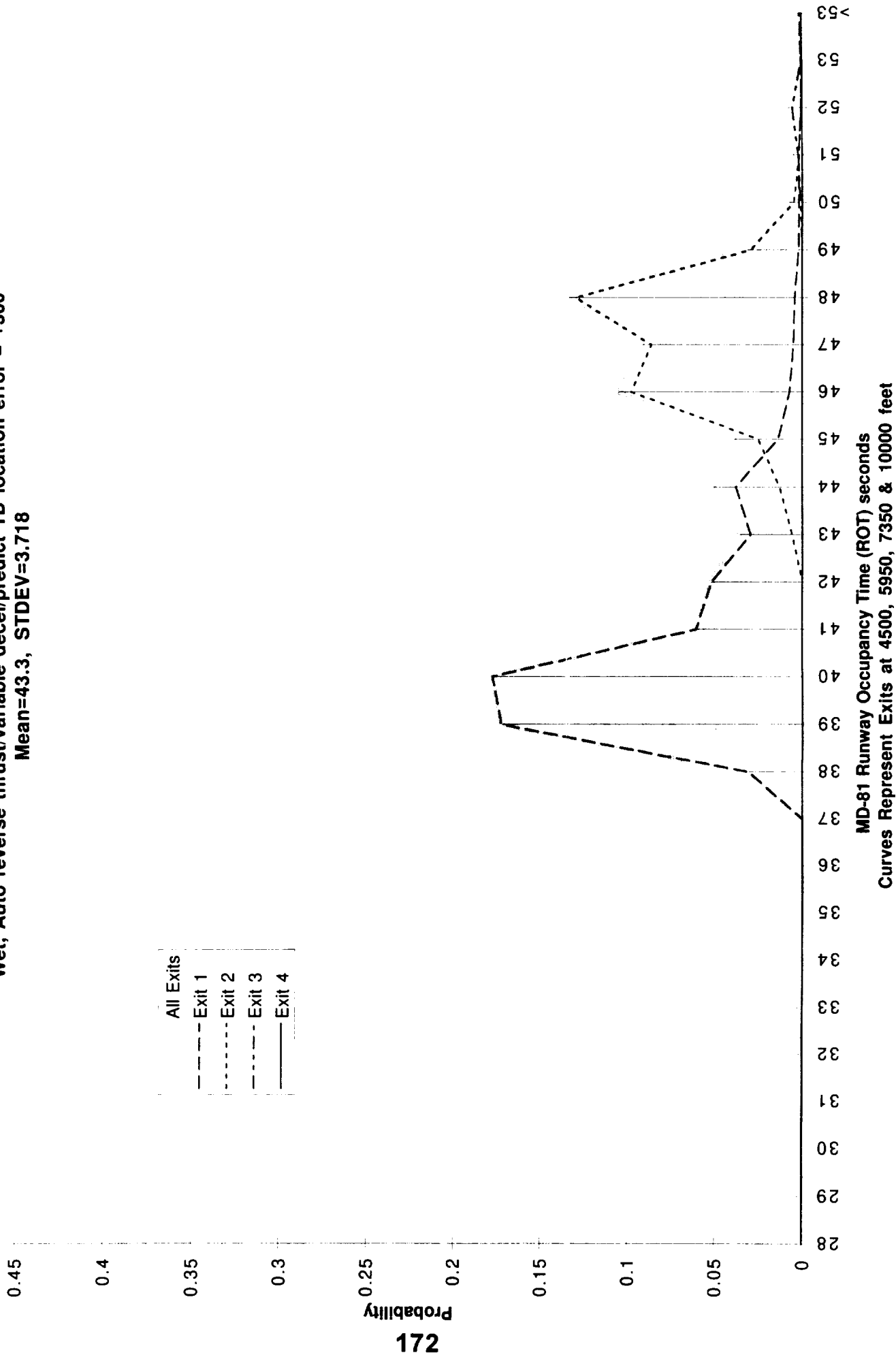
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
predict TD location error = +300
Stow Reverse Thrust=70 kt gd

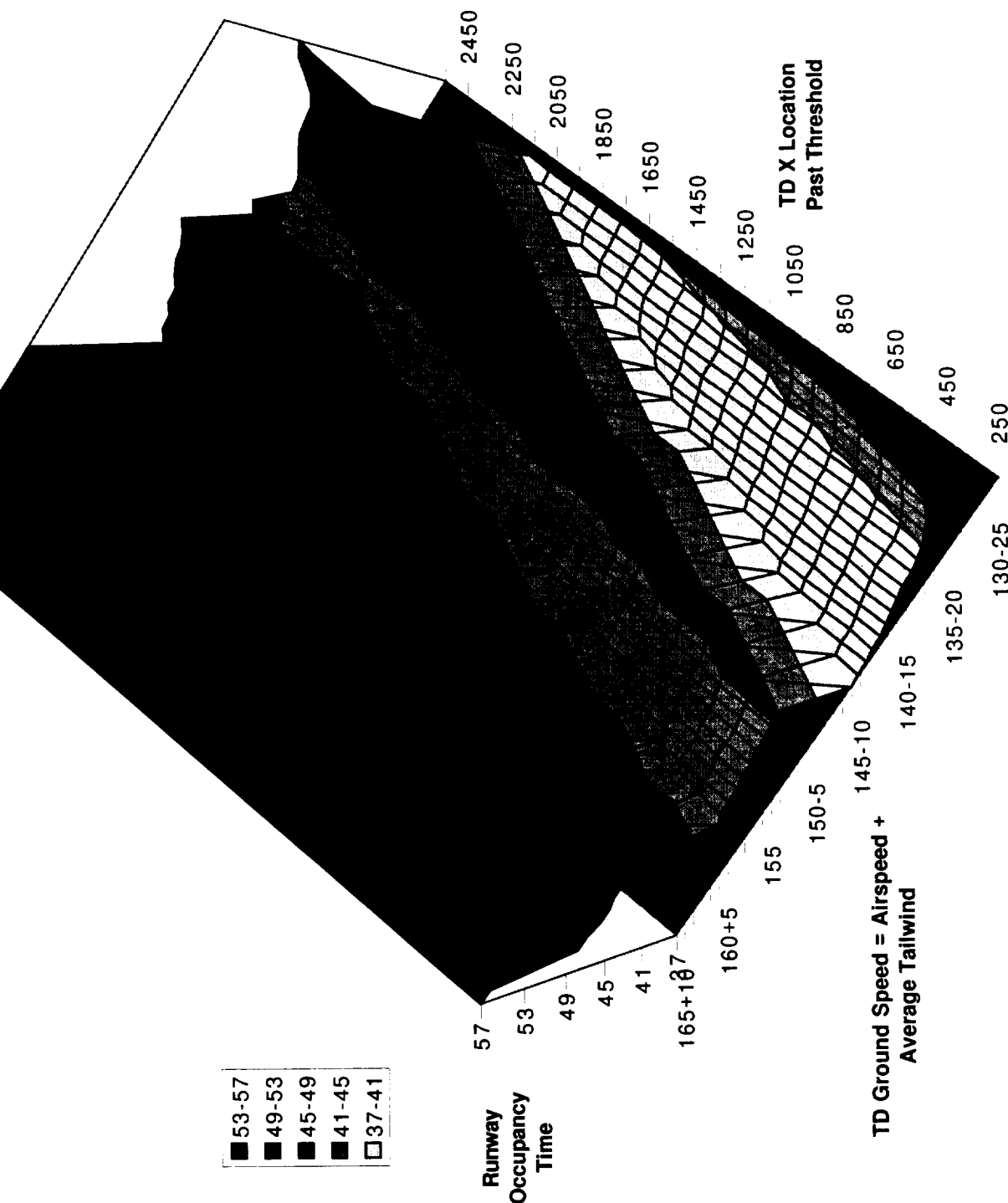


MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/predict TD location error = +300
Mean=43.3, STDEV=3.718

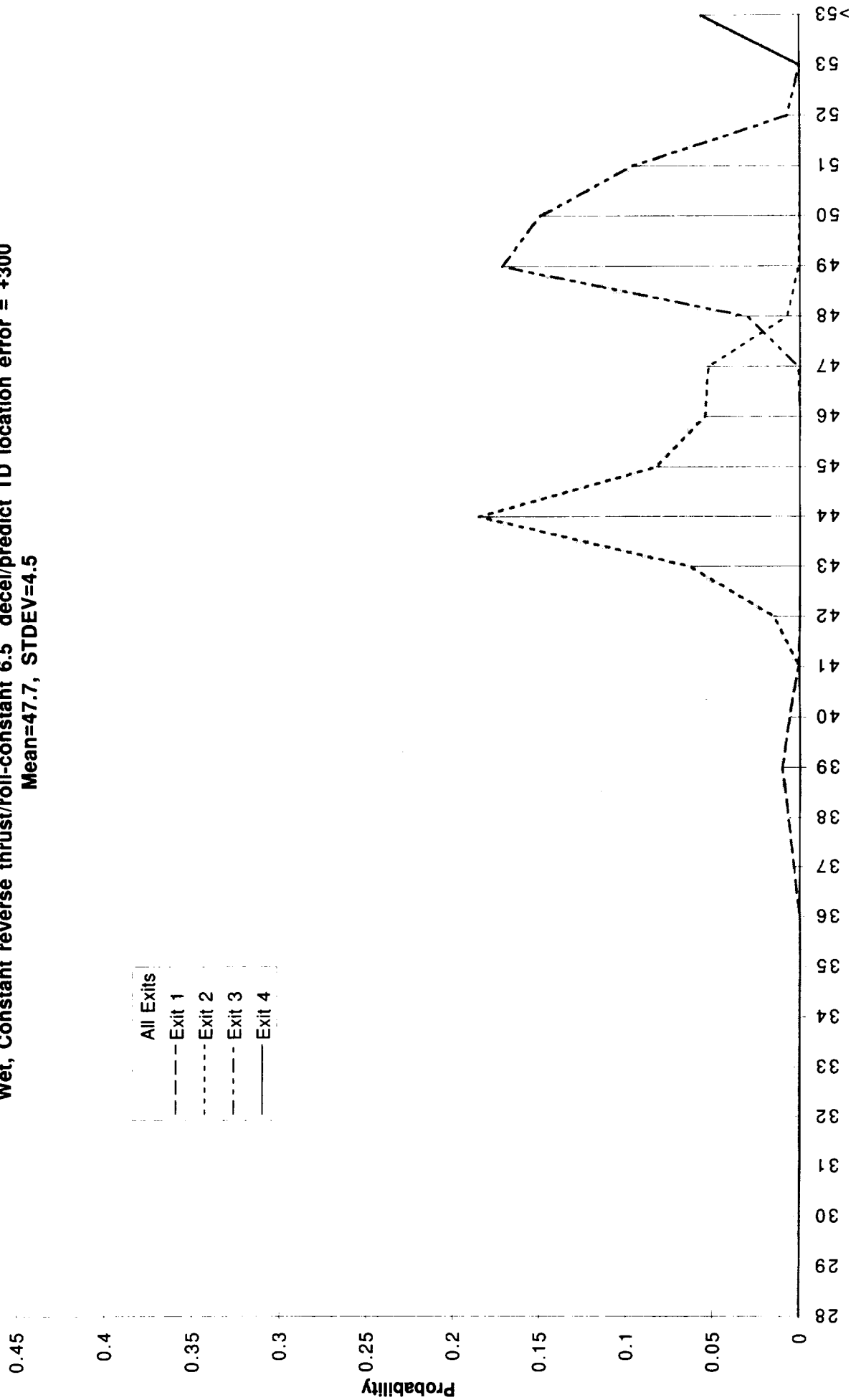


Predict exit prior to TD
 Predict TD location error = +300
 $Weight = 340K + (480K - 340K) * (VEAS - 130) / 36$
 $CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$

MD-11 ROTO Occupancy Time
 Wet, Exits=4500,5950,7350,10000
 Const Rev Thrust/Roll-const 6.5 Decel
 Stow Rev Thrust and coast below 70kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Wet, Constant reverse thrust/roll-constant 6.5 decel/predict TD location error = +300
Mean=47.7, STDEV=4.5

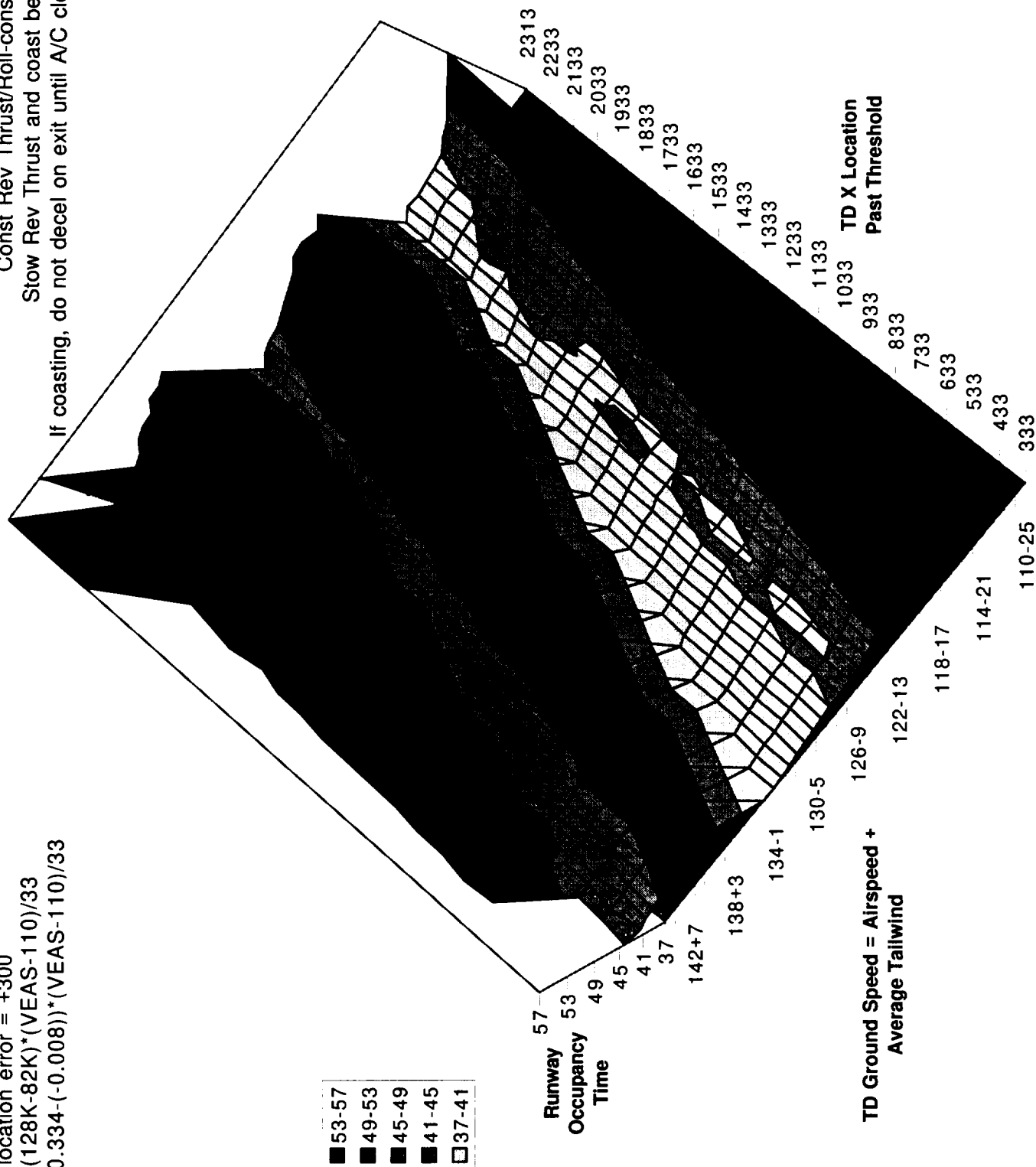


MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

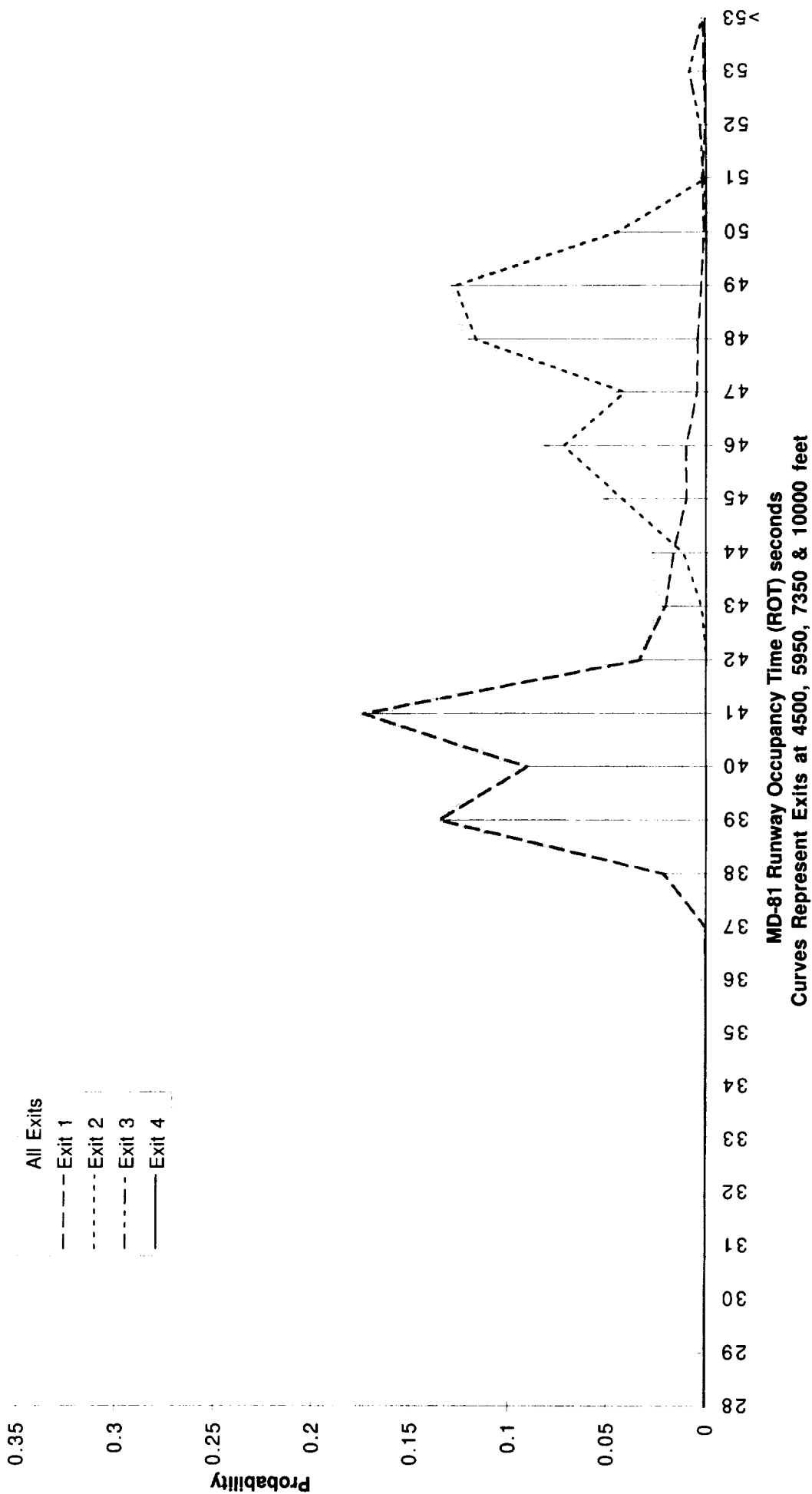
Wet, Exits=4500, 5950, 7350, 10000
 Const Rev Thrust/Roll-const 6.5 Decel
 Stow Rev Thrust and coast below 70kt gd
 If coasting, do not decel on exit until A/C clears runway

MD-81 ROTO Occupancy Time

Predict exit prior to TD
 Predict TD location error = +300
 $Weight = 82K + (128K - 82K) * (VEAS - 110) / 33$
 $CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$



MD-81 ROTO ROT Probability Distribution
Wet, Constant reverse thrust/roll-constant 6.5 decel/predict TD location error = +300
Mean=44.1, STDEV=4.038



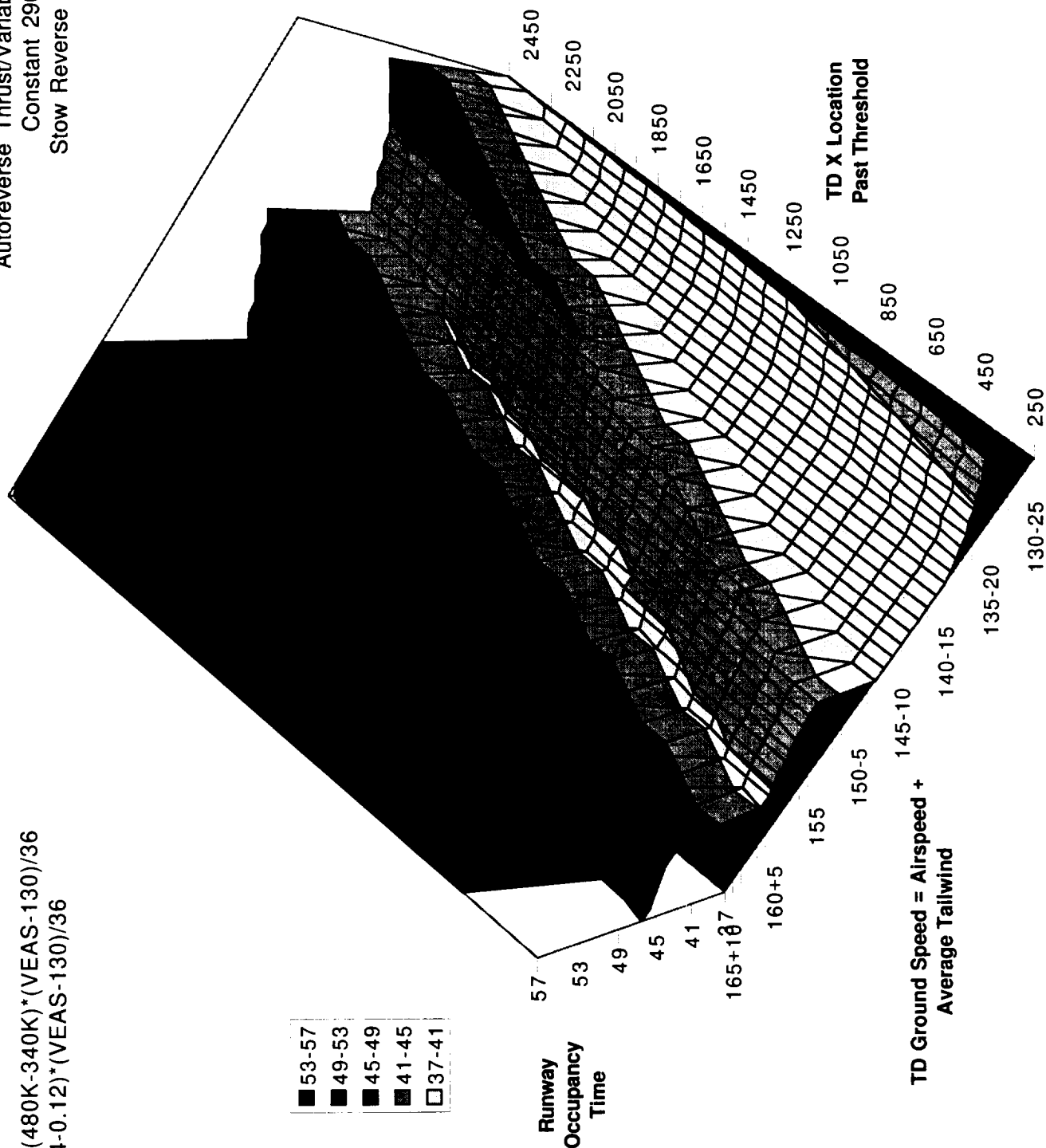
Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Constant 2900 ft exit radius
Stow Reverse Thrust=70 kt gd

MD-11 ROTO Occupancy Time

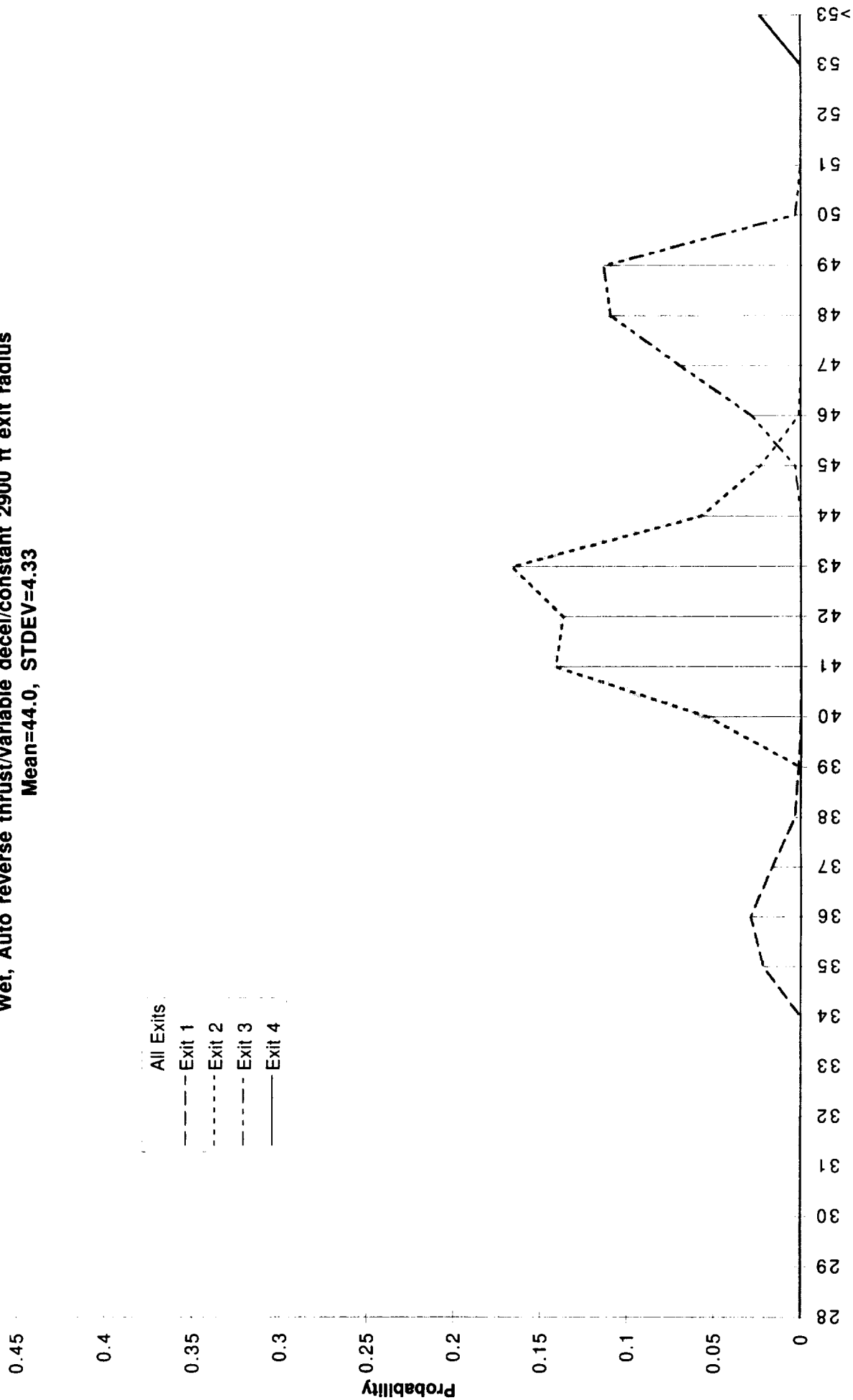
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/constant 2900 ft exit radius
Mean=44.0, STDEV=4.33



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

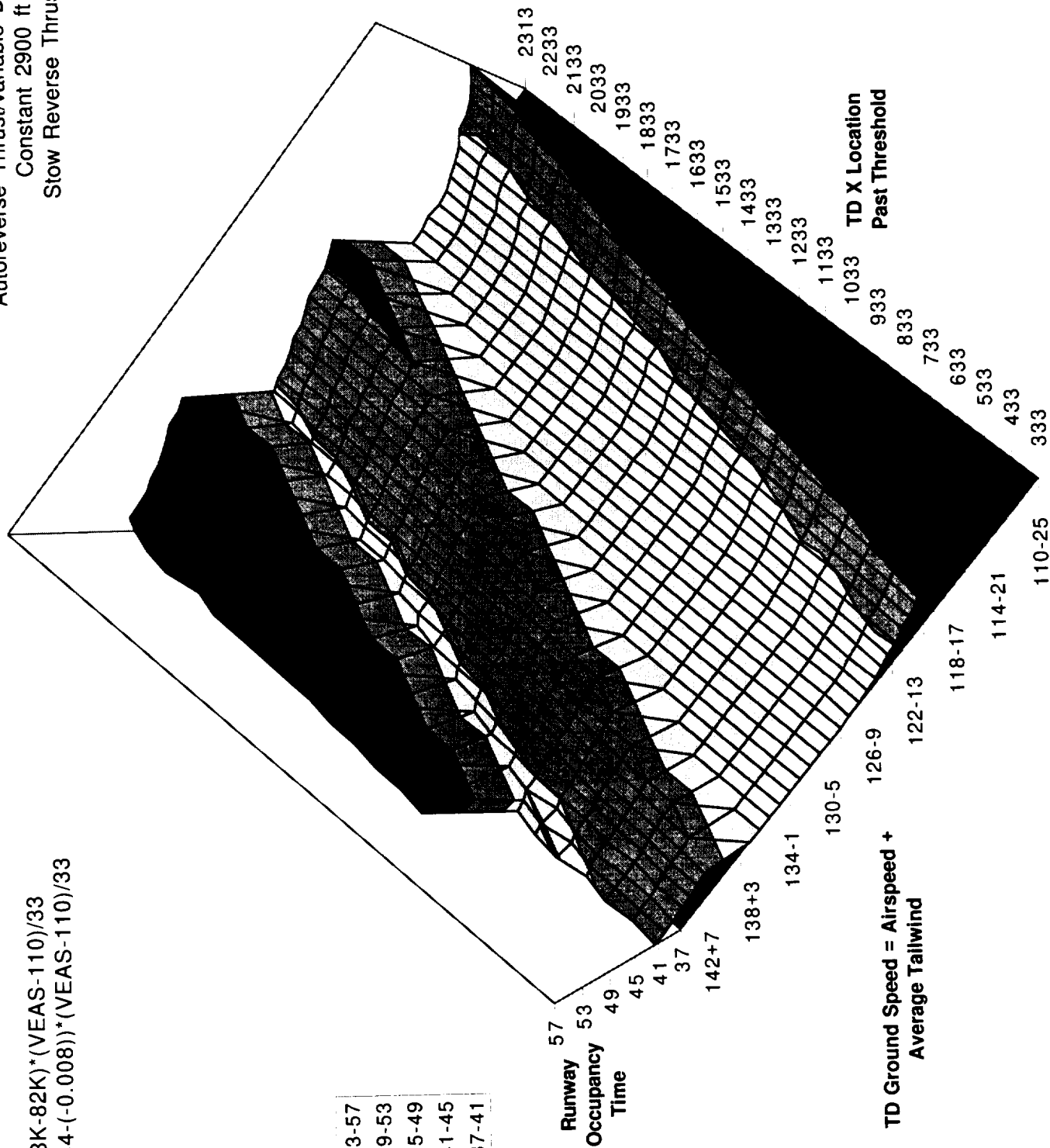
Wet, Exits=4500, 5950, 7350, 10000
 Autoreverse Thrust/variable Deceleration
 Constant 2900 ft exit radius
 Stow Reverse Thrust=70 kt gd

MD-81 ROTO Occupancy Time

Predict exit prior to TD

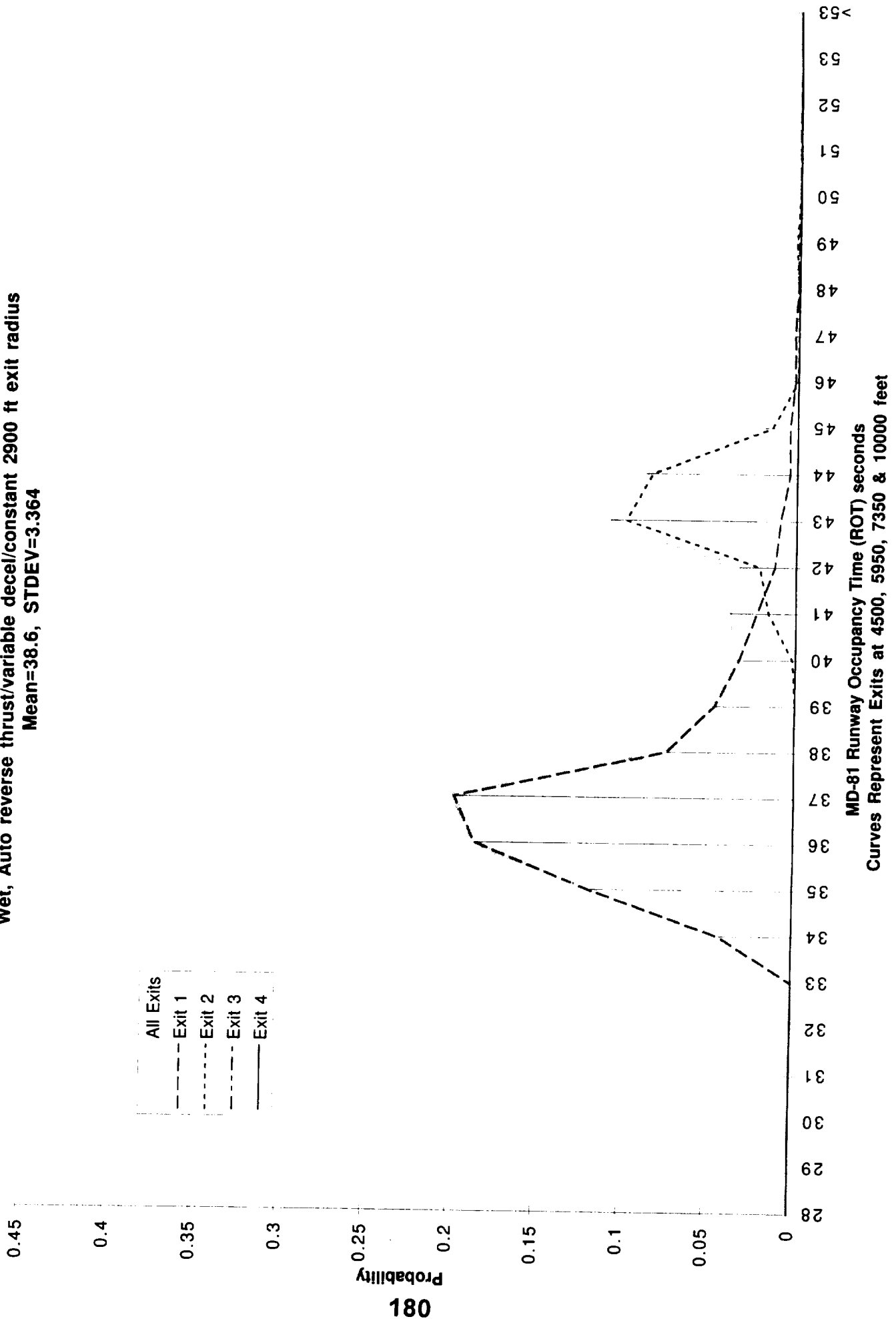
$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

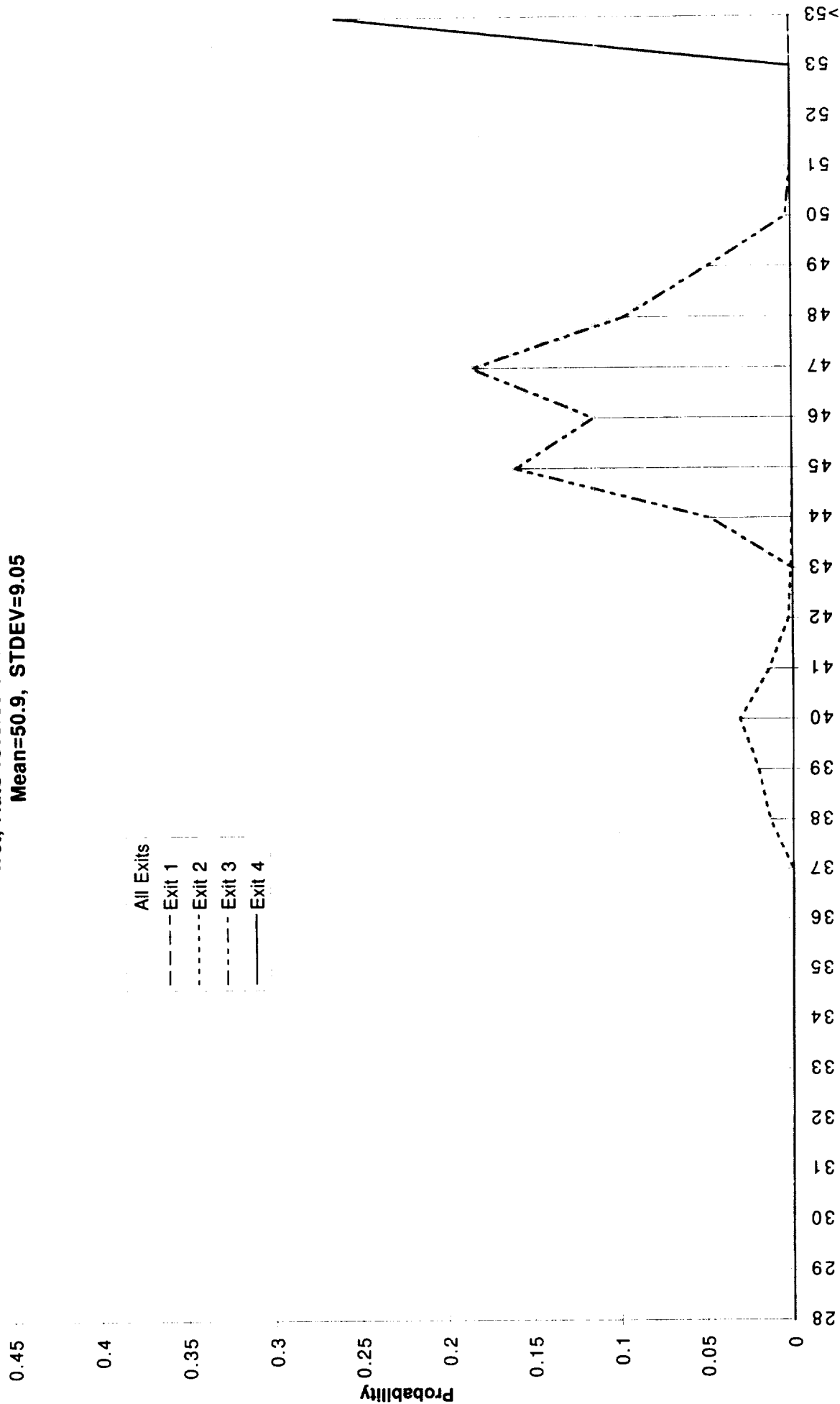


- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/constant 2900 ft exit radius
Mean=38.6, STDEV=3.364



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=50.9, STDEV=9.05



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3100, 4550, 6150 & 10000 feet

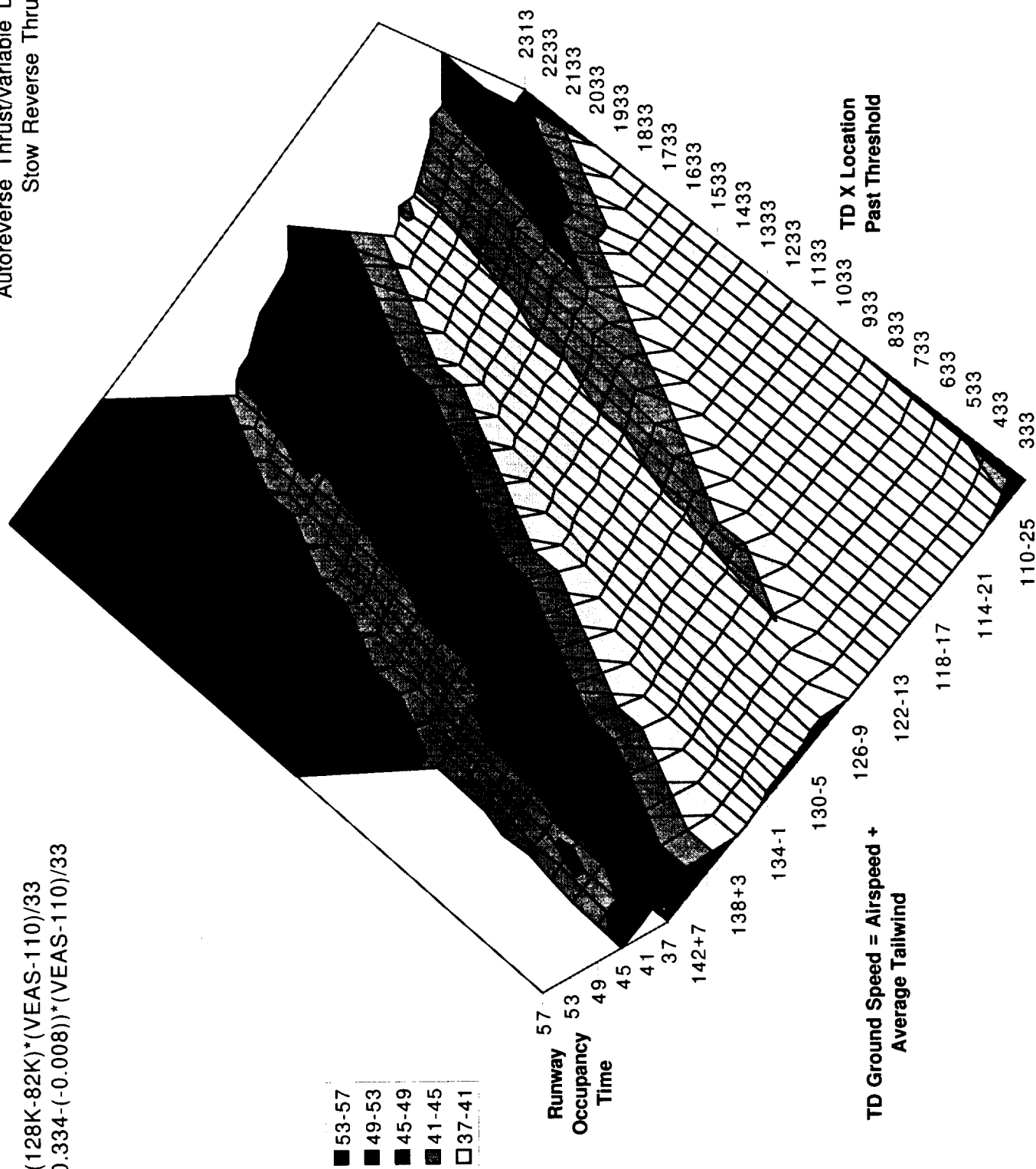
Wet, Exits=3100,4550,6150,10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

MD-81 ROTO Occupancy Time

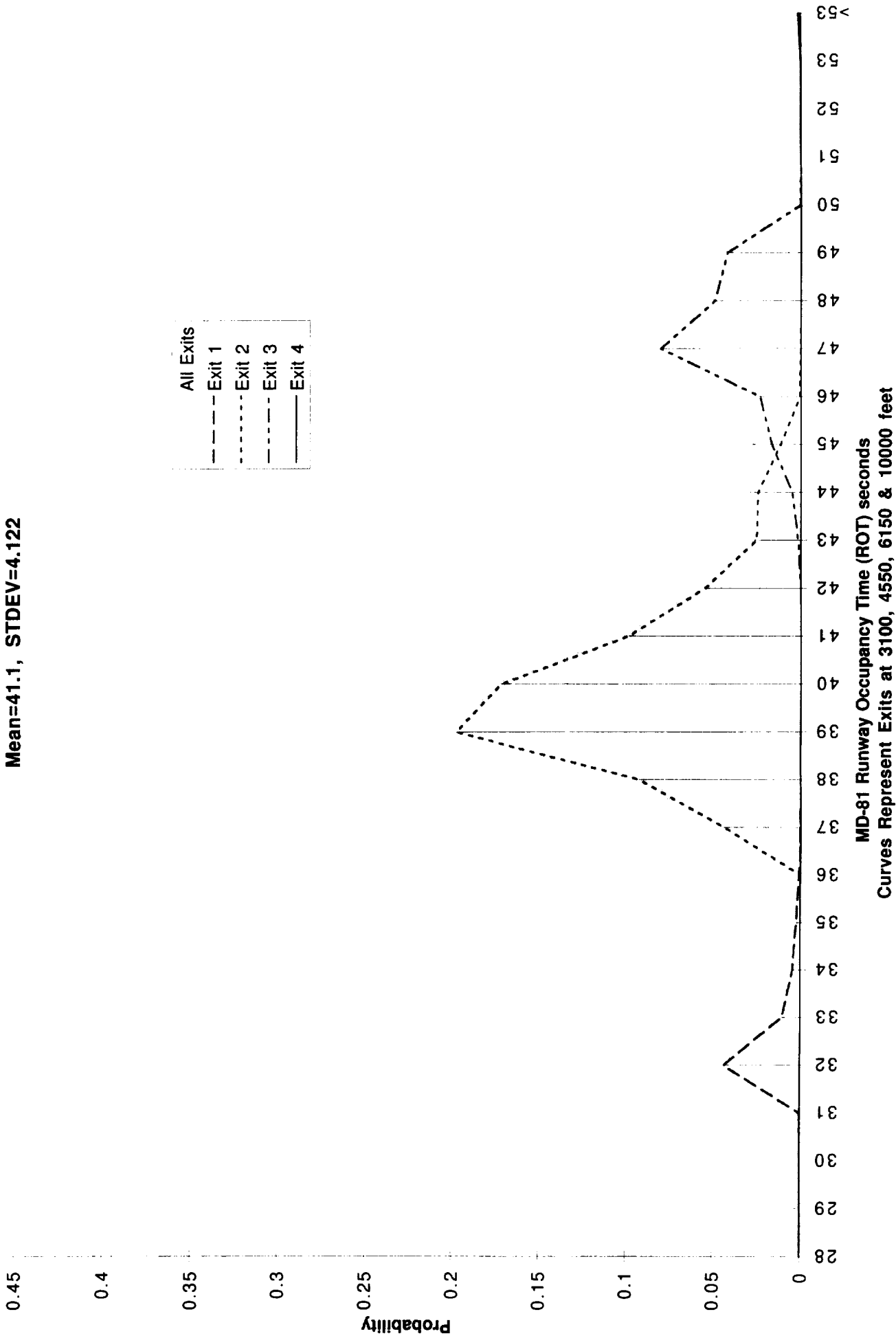
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=41.1, STDEV=4.122



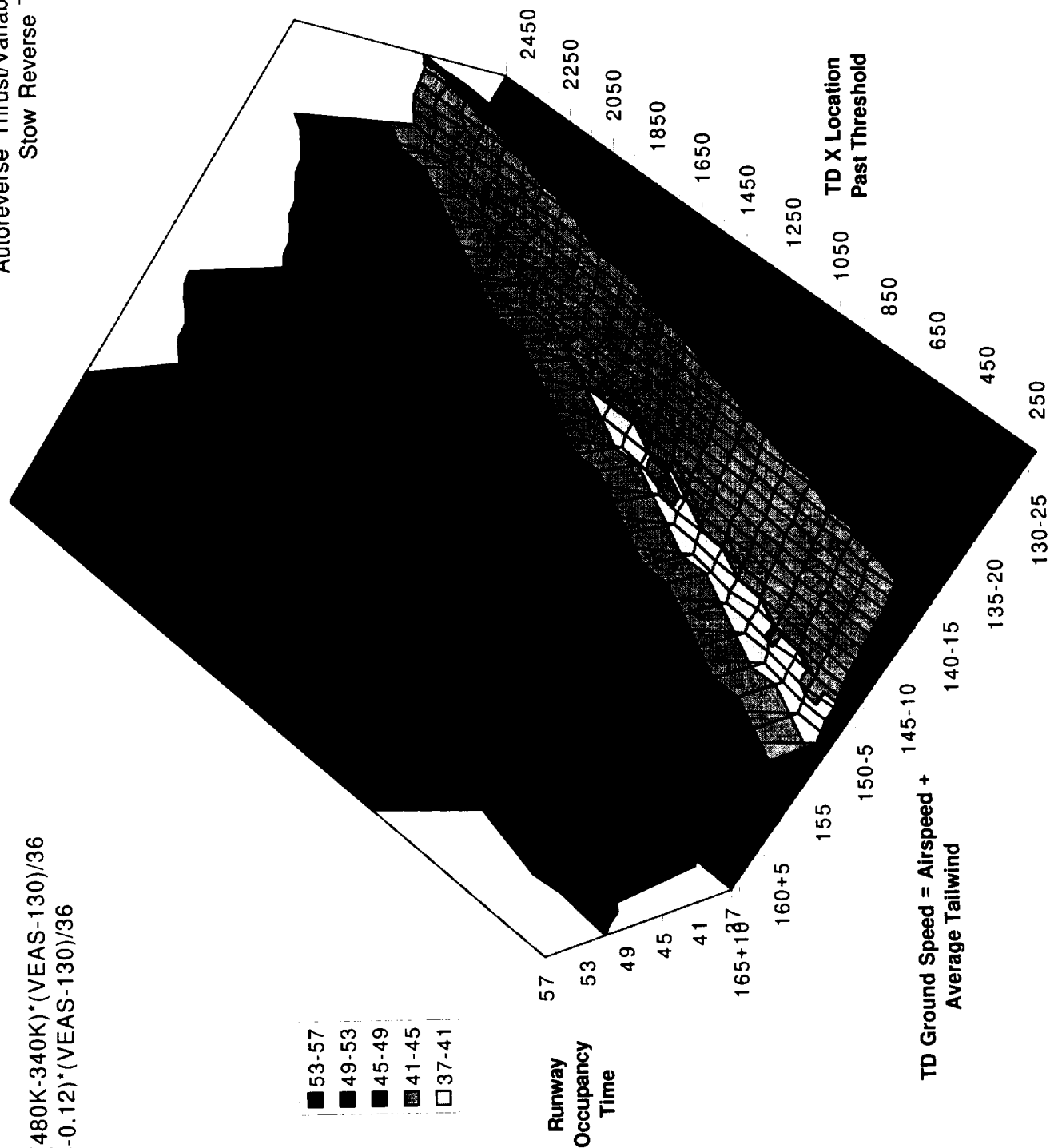
Wet, Exits=5100,6550,7750,12000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd

MD-11 ROTO Occupancy Time

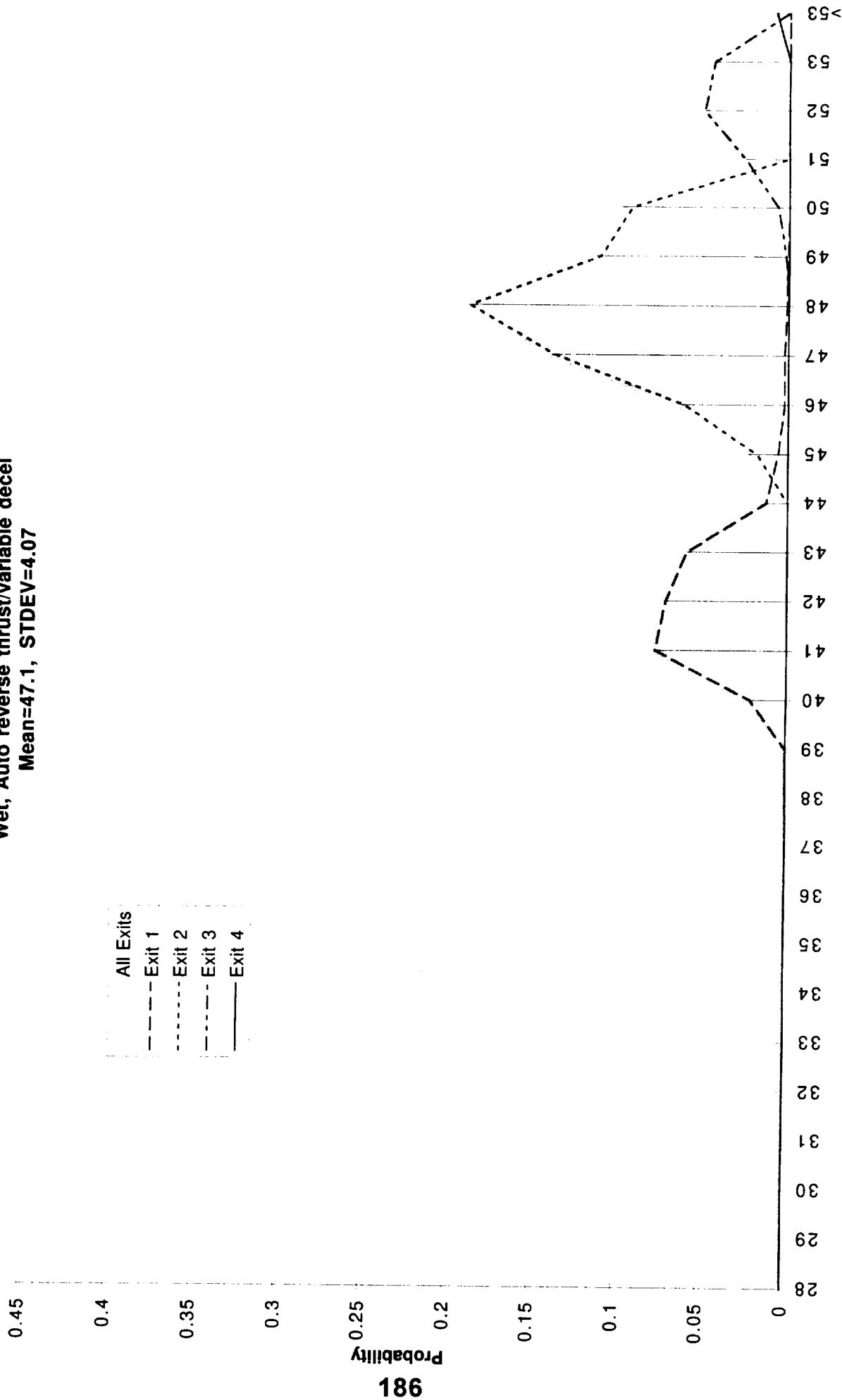
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$

$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=47.1, STDEV=4.07



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 5100, 6550, 7750 & 12000 feet

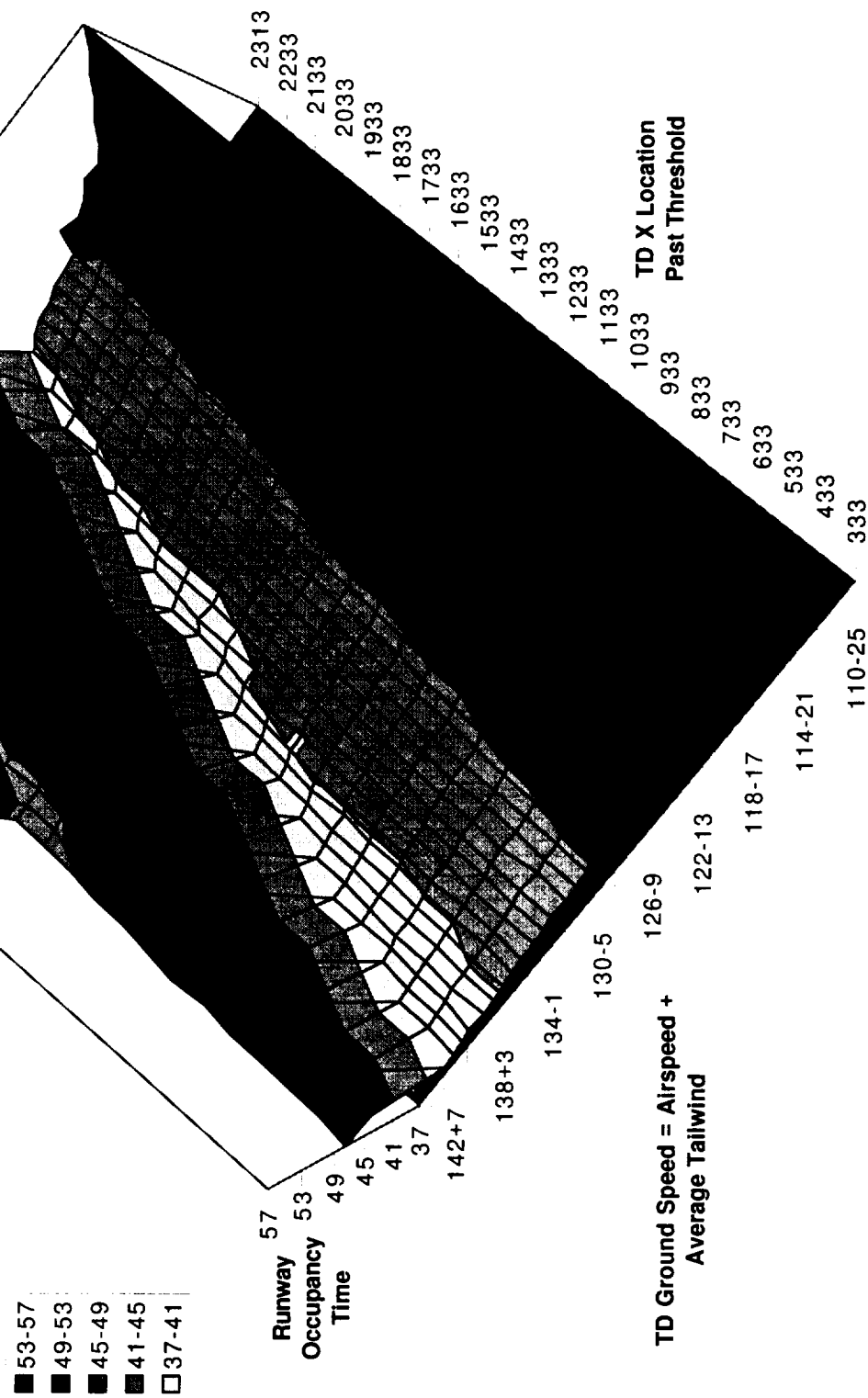
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

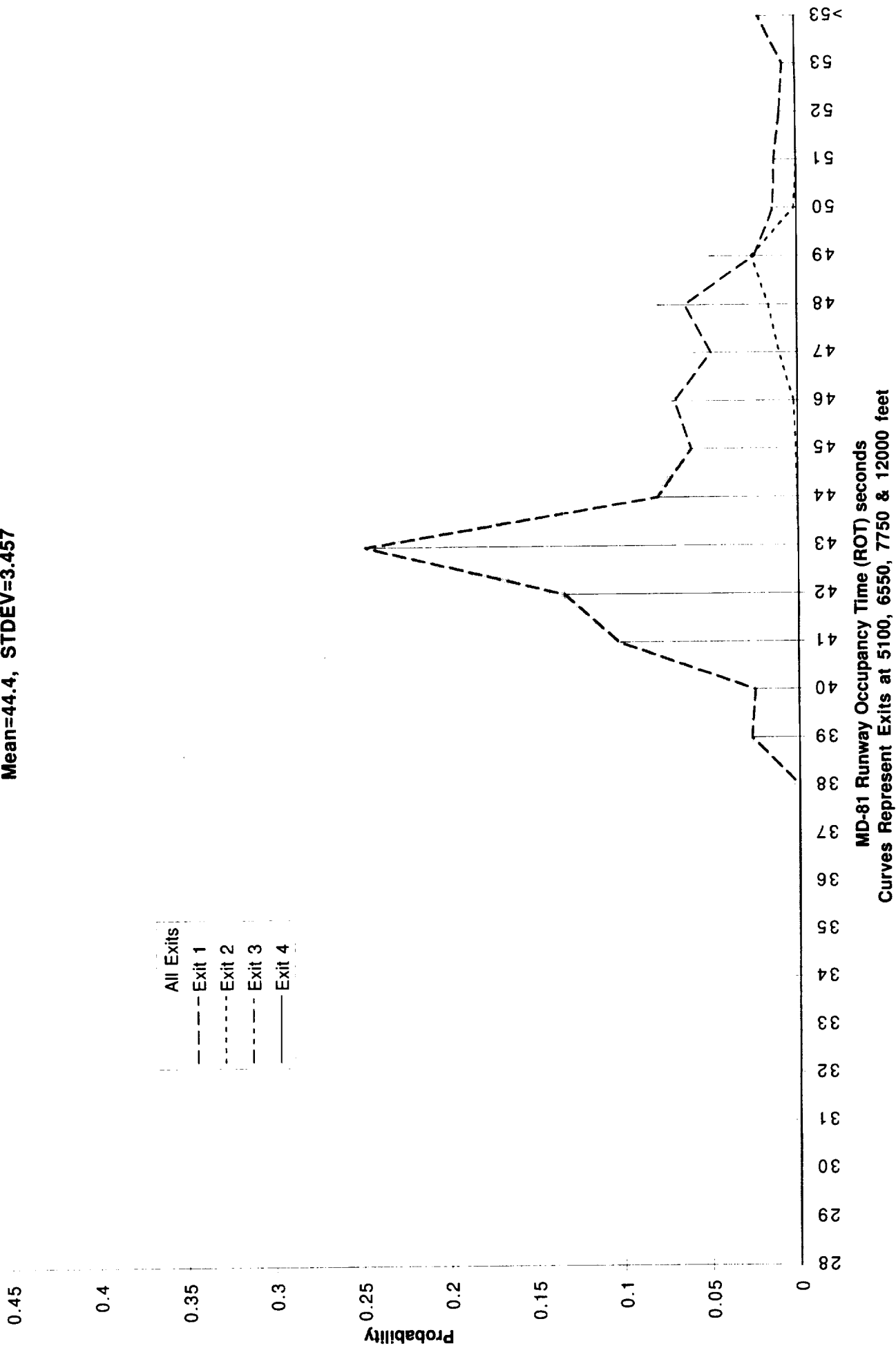
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=5100, 6550, 7750, 12000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd



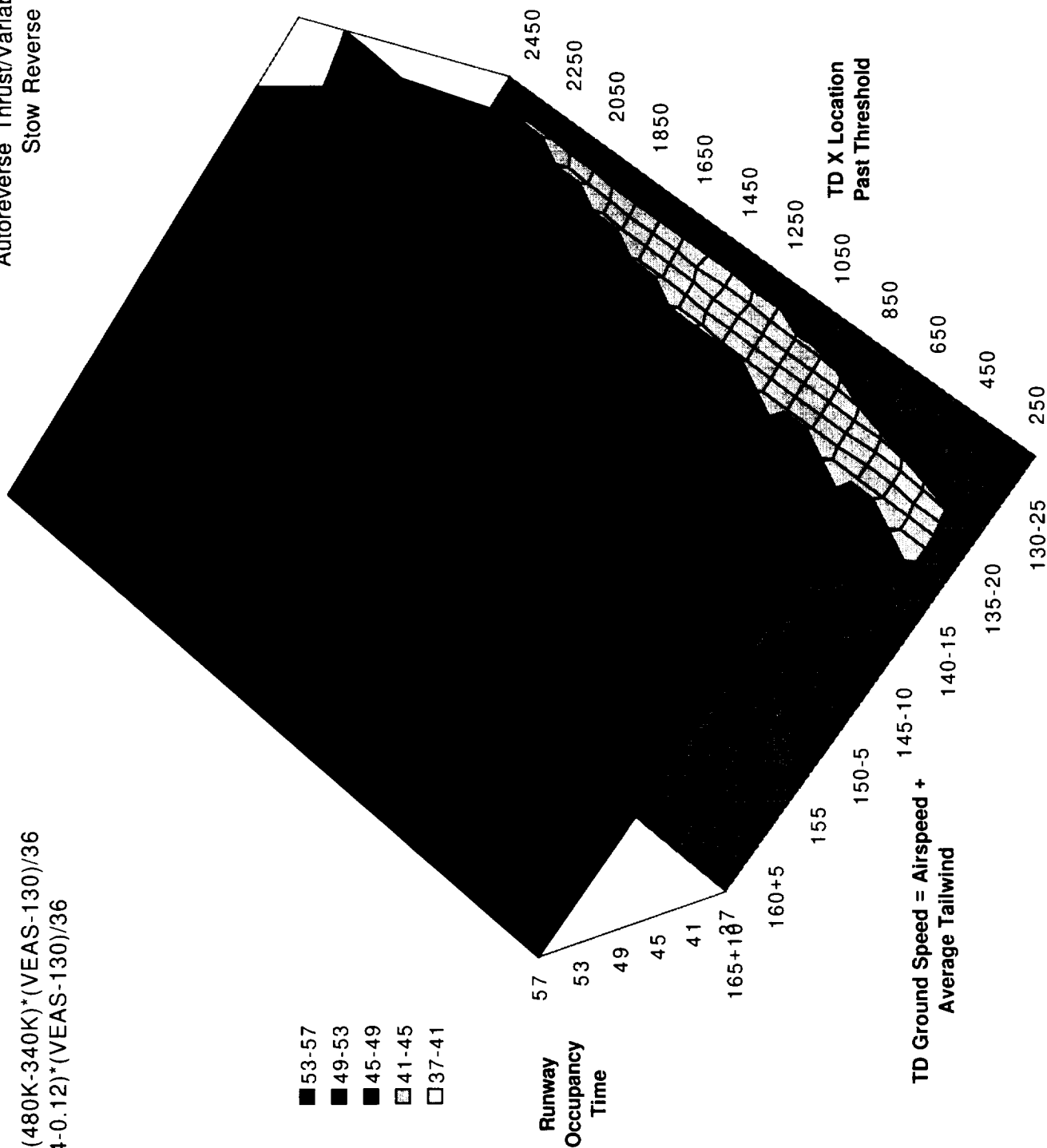
MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel
Mean=44.4, STDEV=3.457



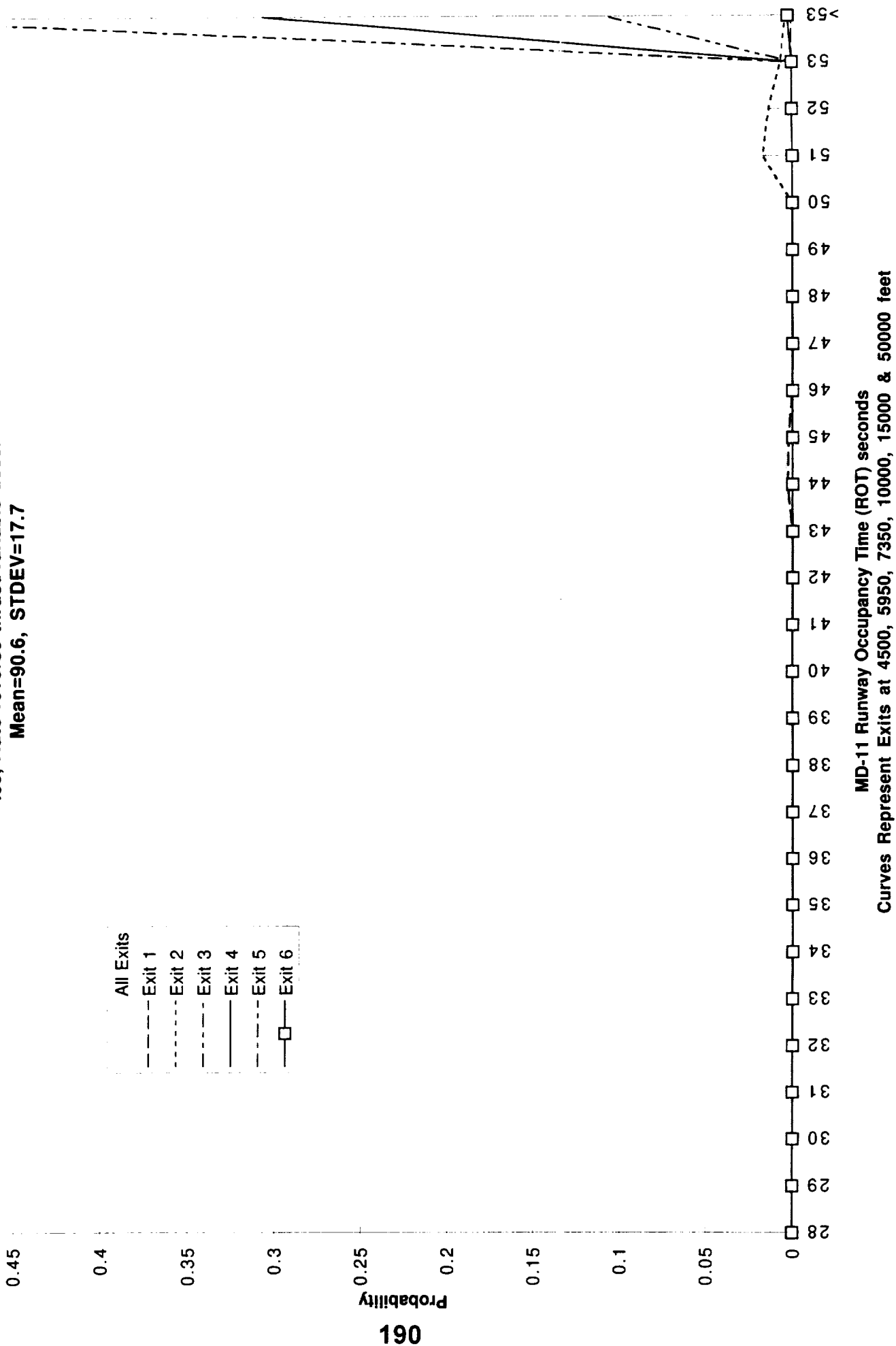
Predict exit prior to TD
 $Weight = 340K + (480K - 340K) * (VEAS - 130) / 36$
 $CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$

MD-11 ROTO Occupancy Time

Ice, Exits=4500, 5950, 7350, 10000, 15000, 50000
 Autoreverse Thrust/Variable Deceleration
 Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Ice, Auto reverse thrust/variable decel
Mean=90.6, STDEV=17.7

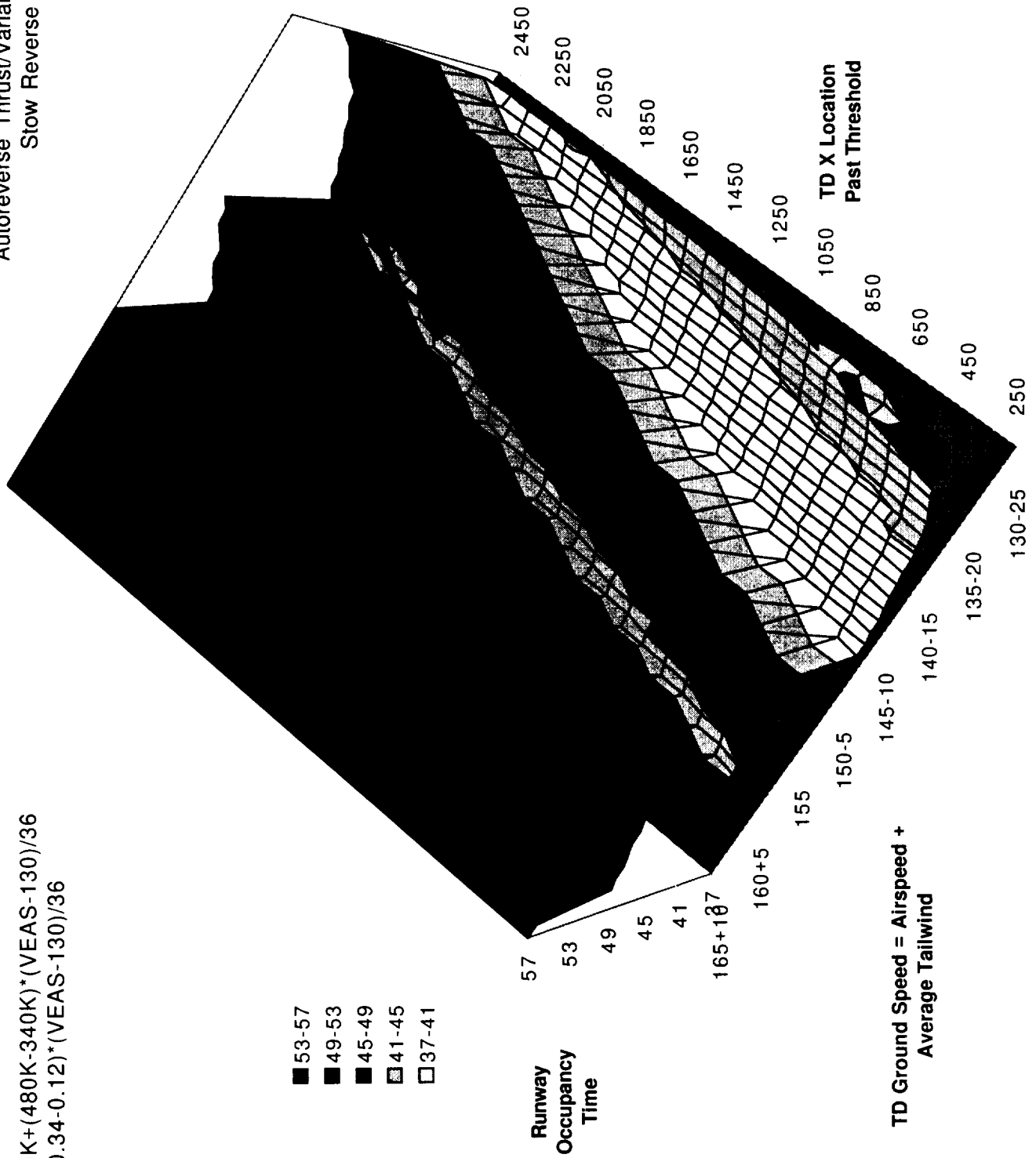


MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350, 10000, 15000 & 50000 feet

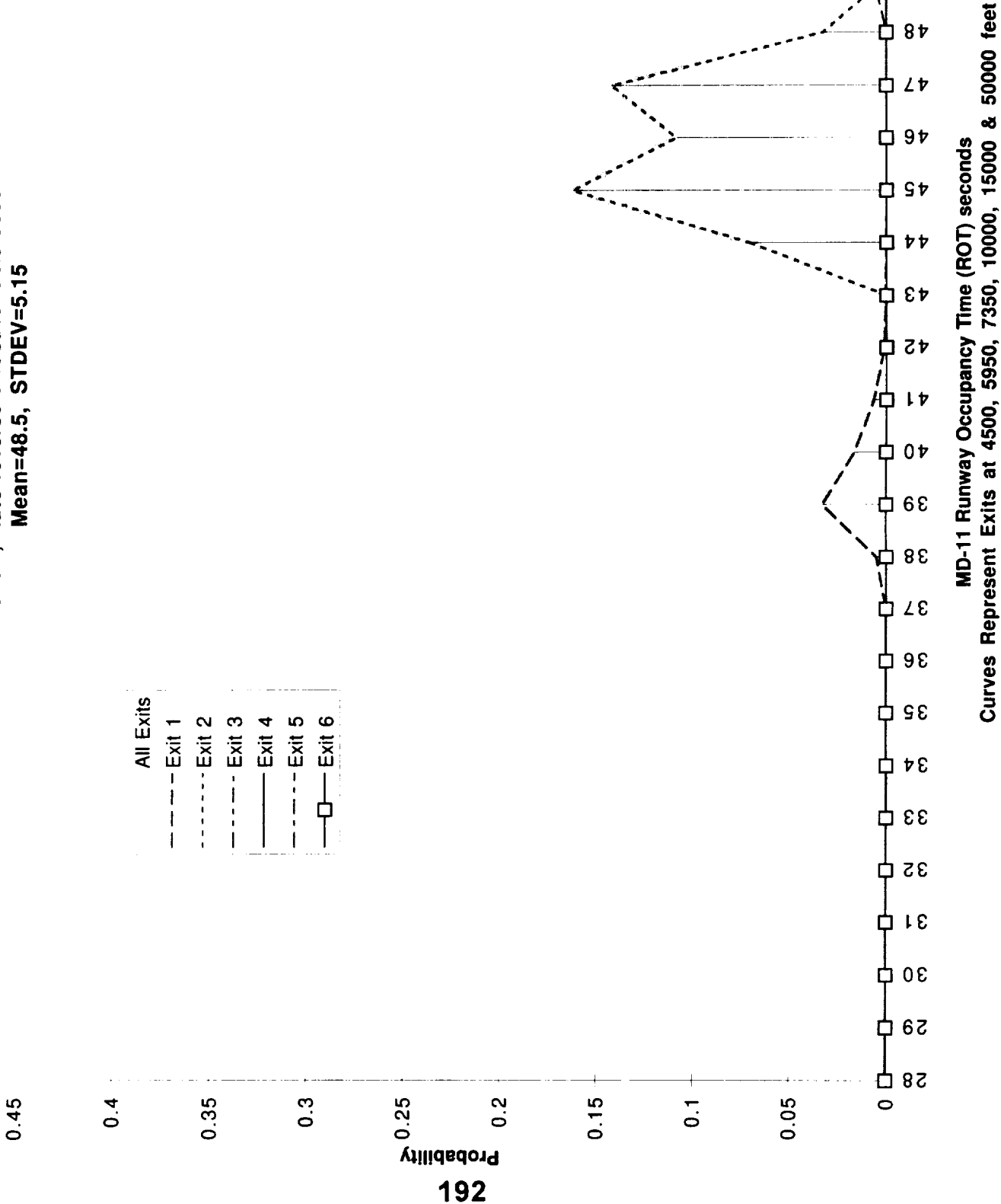
Predict exit prior to TD
 MD-11 ROTO Occupancy Time Snow, Exits=4500, 5950, 7350, 10000, 15000, 50000
 Autoreverse Thrust/Variable Deceleration
 Stow Reverse Thrust=70 kt gd

$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$

$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$



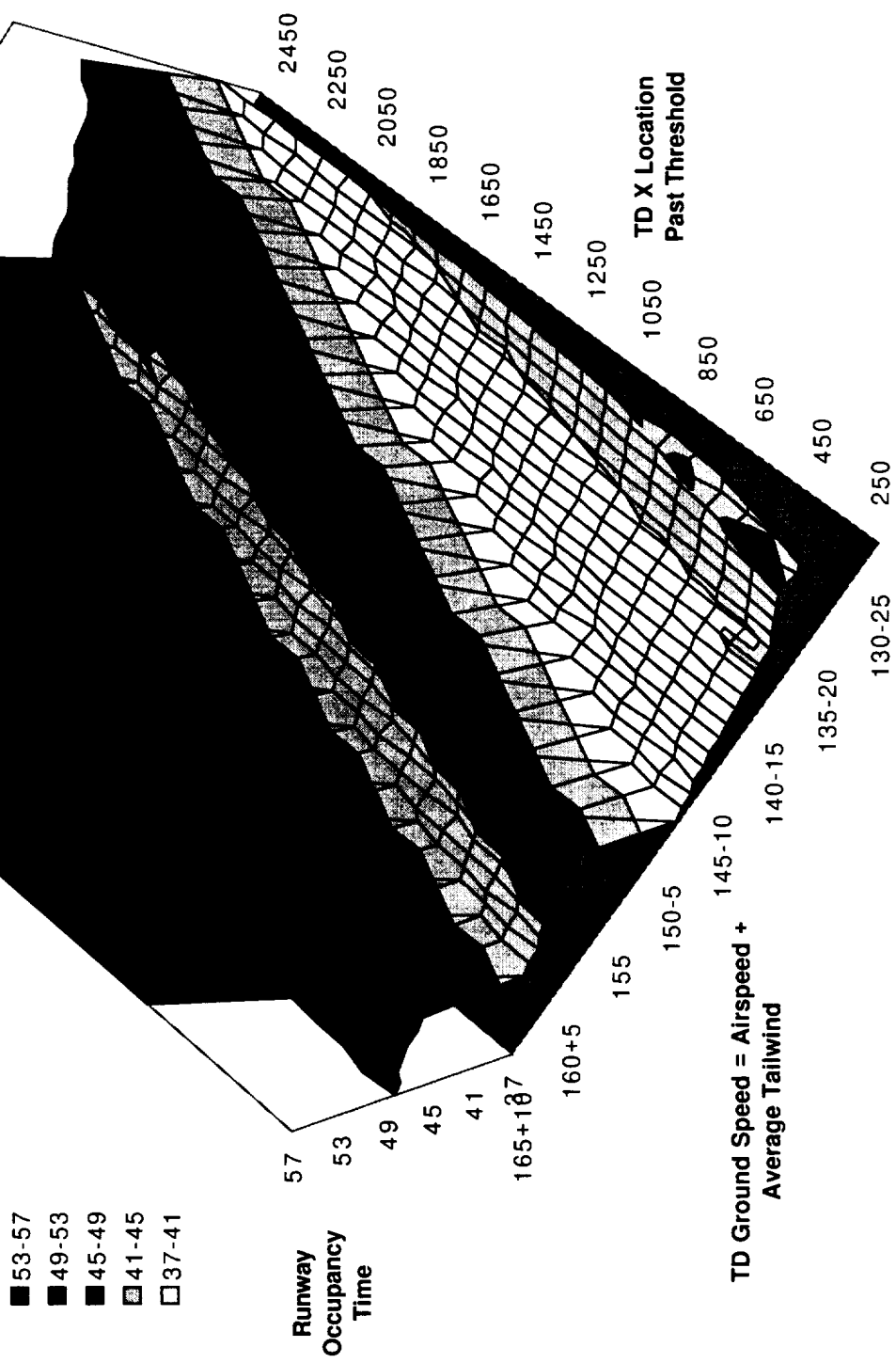
MD-11 ROTO ROT Probability Distribution
 Snow, Auto reverse thrust/variable decel
 Mean=48.5, STDEV=5.15



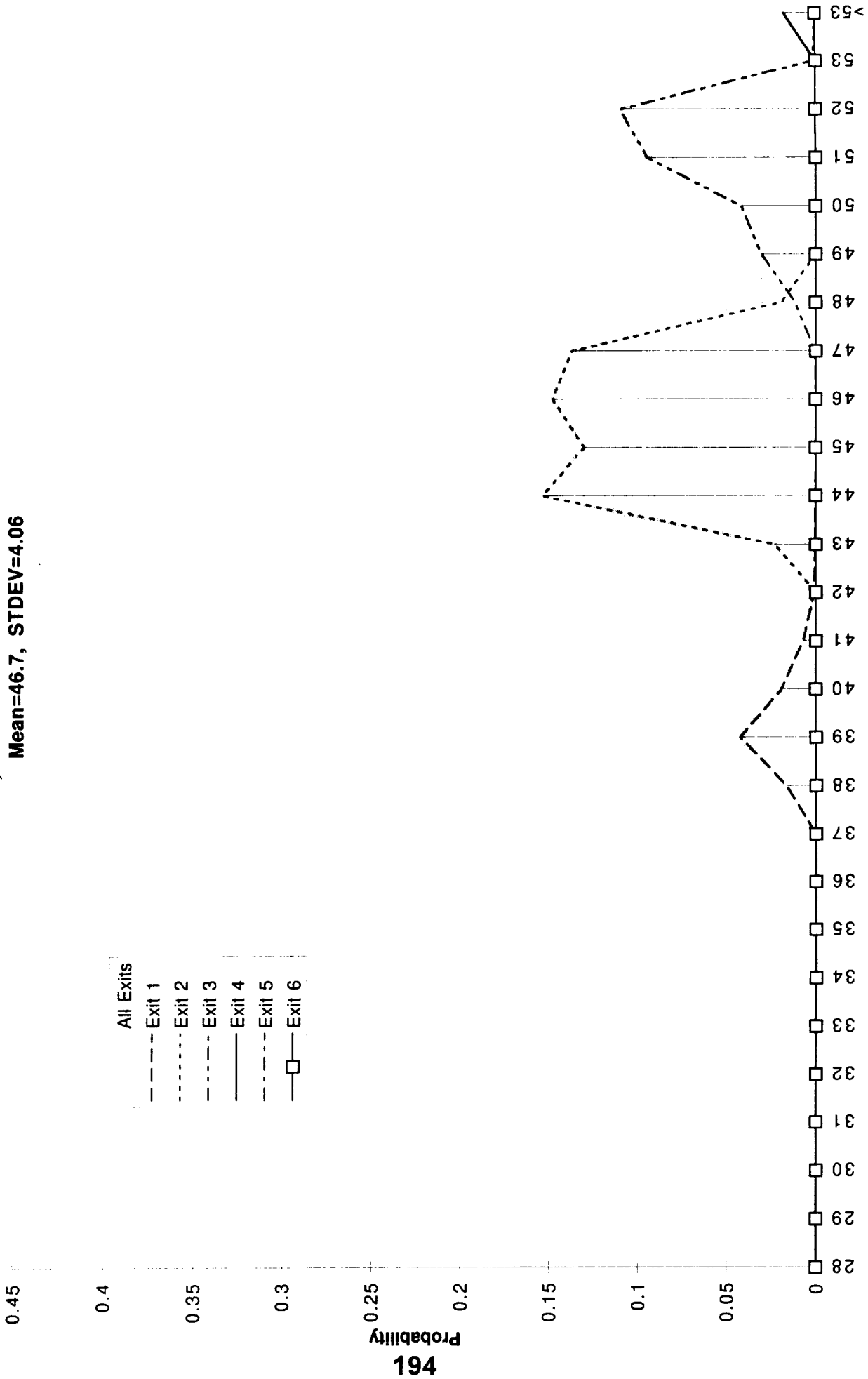
Predict exit prior to TD

MD-11 ROTO Occupancy Time Slush, Exits=4500,5950,7350,10000,15000,50000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd

Weight=340K+(480K-340K)*(VEAS-130)/36
CG=0.12+(0.34-0.12)*(VEAS-130)/36



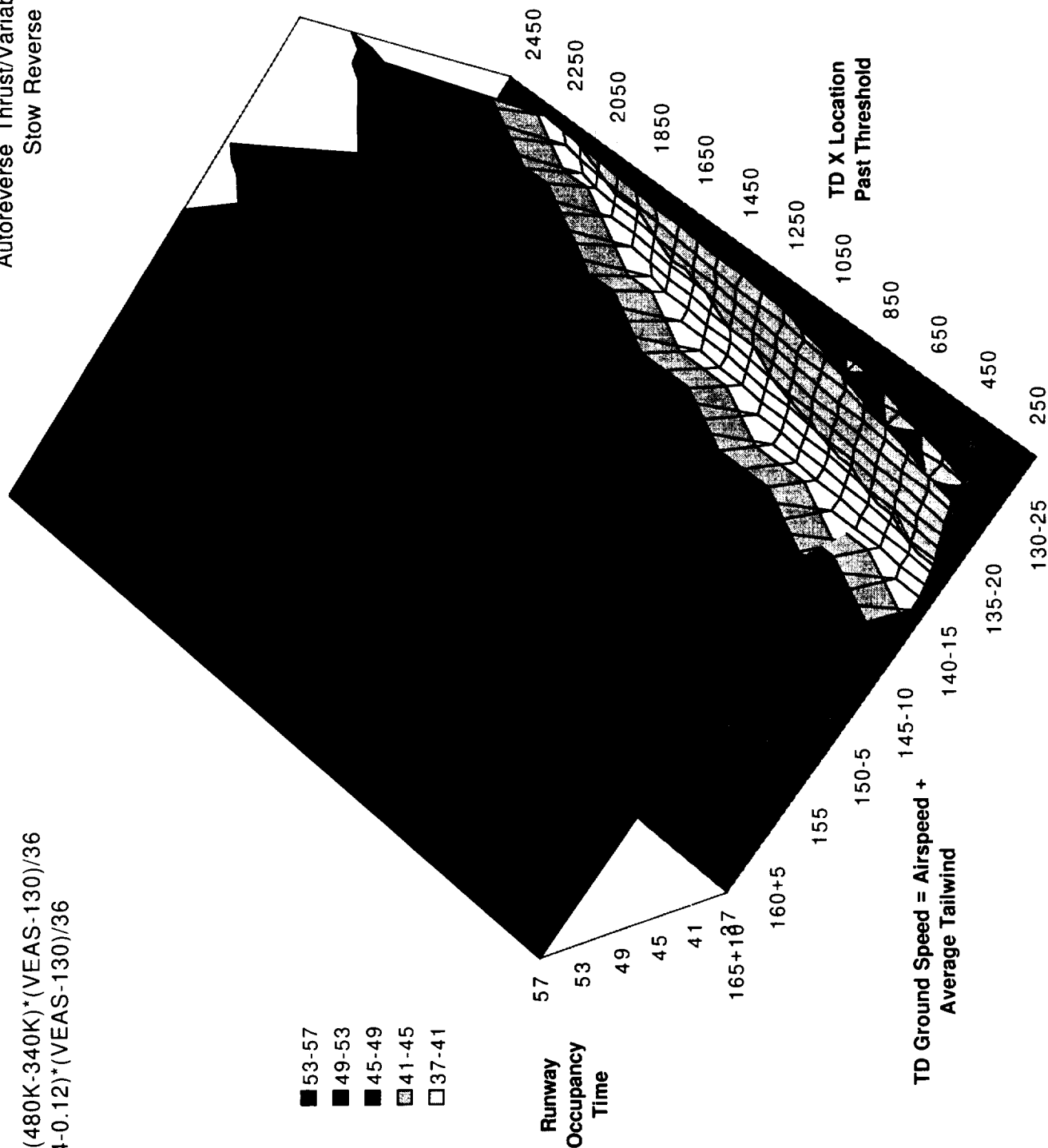
MD-11 ROTO ROT Probability Distribution
 Slush, Auto reverse thrust/variable decel
 Mean=46.7, STDEV=4.06



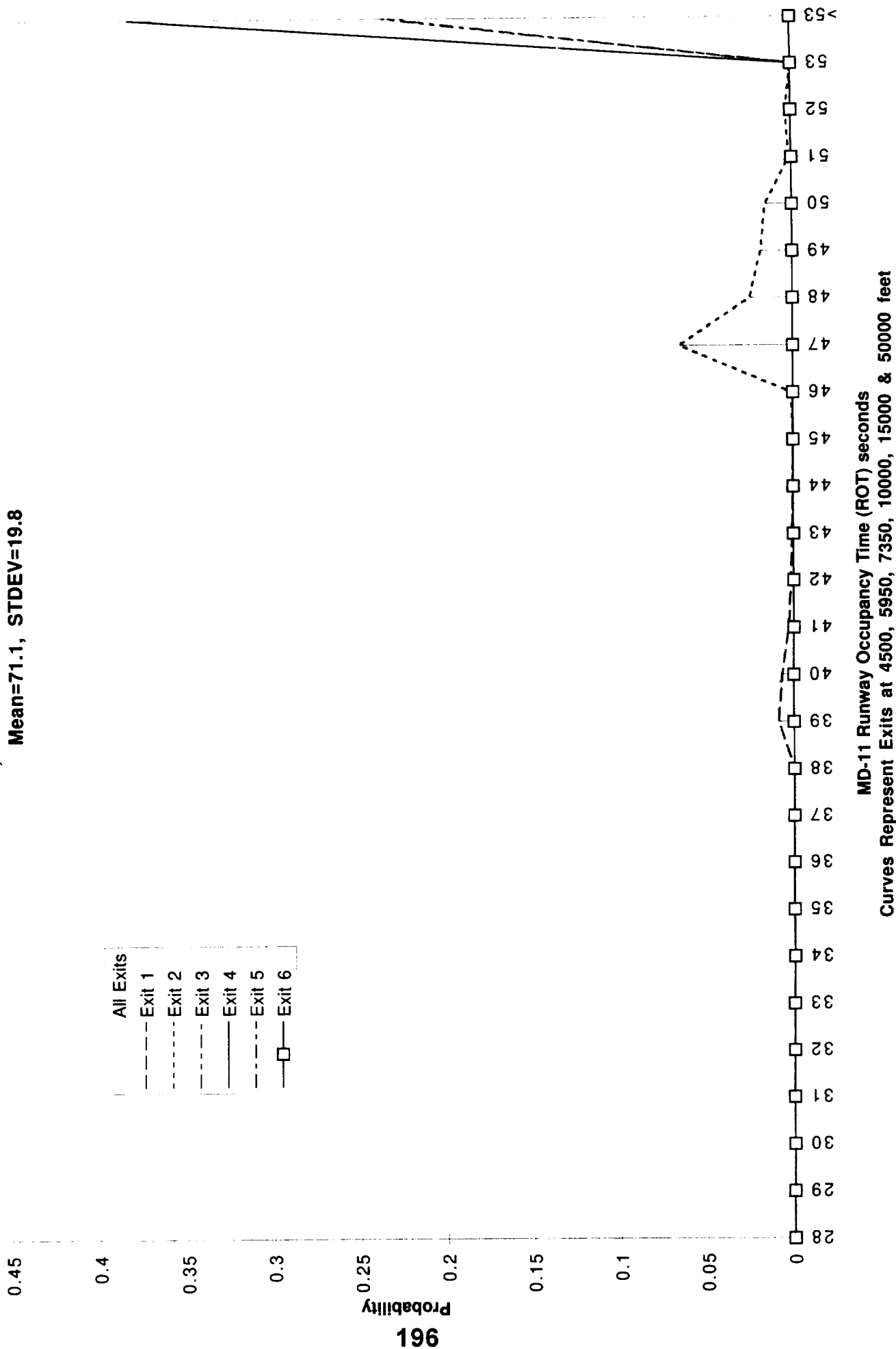
MD-11 Runway Occupancy Time (ROT) seconds
 Curves Represent Exits at 4500, 5950, 7350, 10000, 15000 & 50000 feet

MD-11 ROTO Occupancy Time Flood, Exits=4500, 5950, 7350, 10000, 15000, 50000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=70 kt gd

Predict exit prior to TD
 $Weight = 340K + (480K - 340K) * (VEAS - 130) / 36$
 $CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$



MD-11 ROTO ROT Probability Distribution
Flood, Auto reverse thrust/variable decel
Mean=71.1, STDEV=19.8



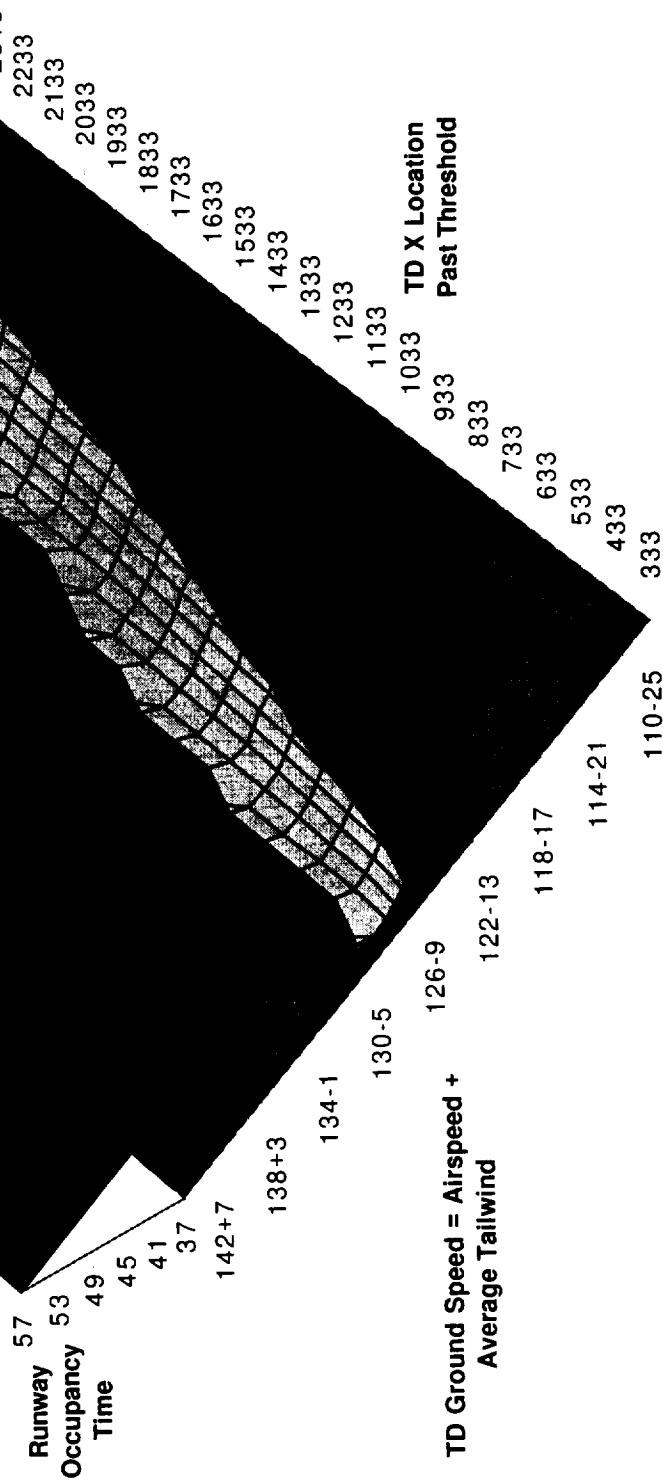
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

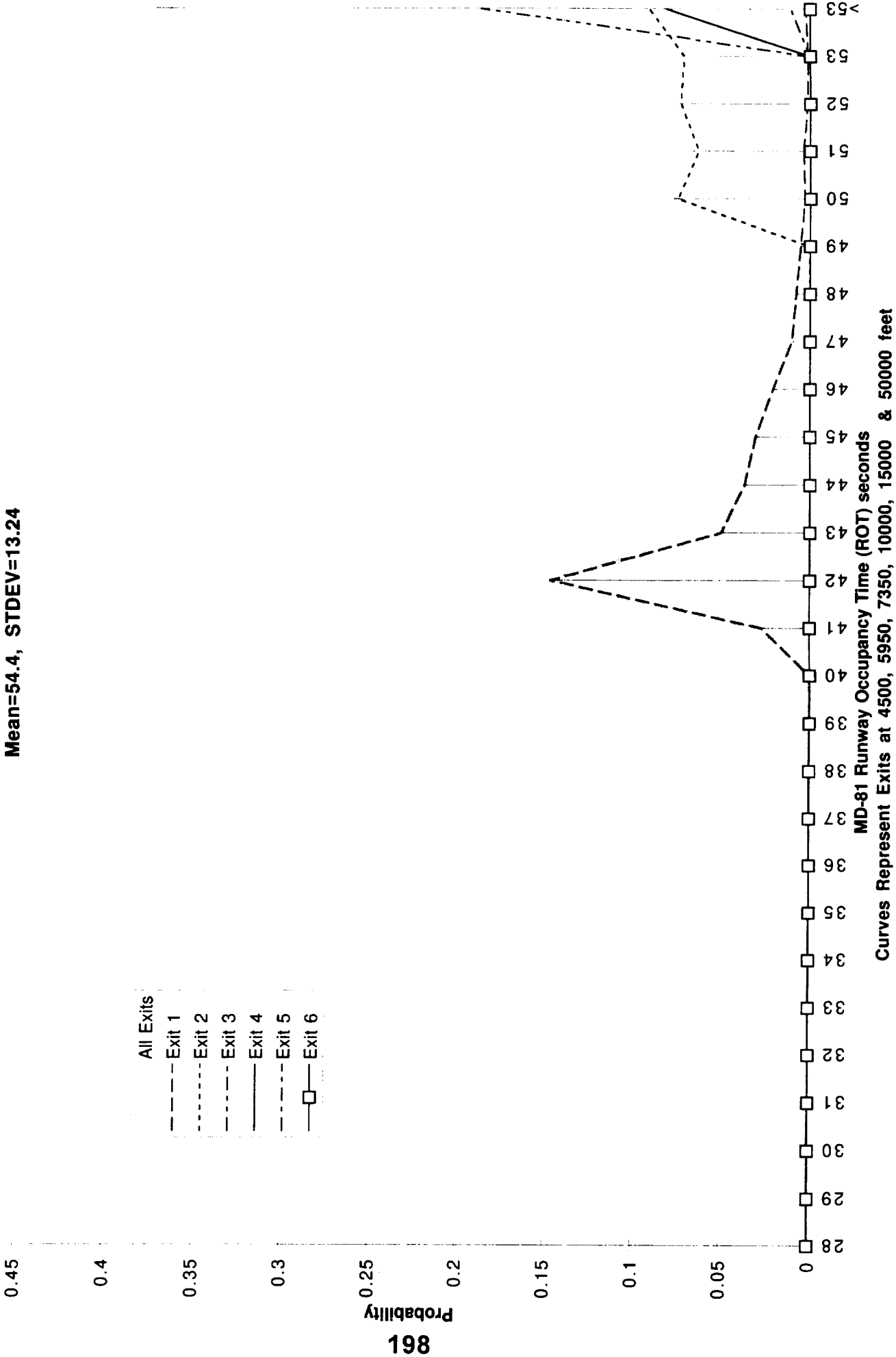
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time Ice, Exits=4500, 5950, 7350, 10000, 15000, 50000
 Autoreverse Thrust/variable Deceleration
 Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-81 ROTO ROT Probability Distribution
Ice, Auto reverse thrust/variable decel
Mean=54.4, STDEV=13.24

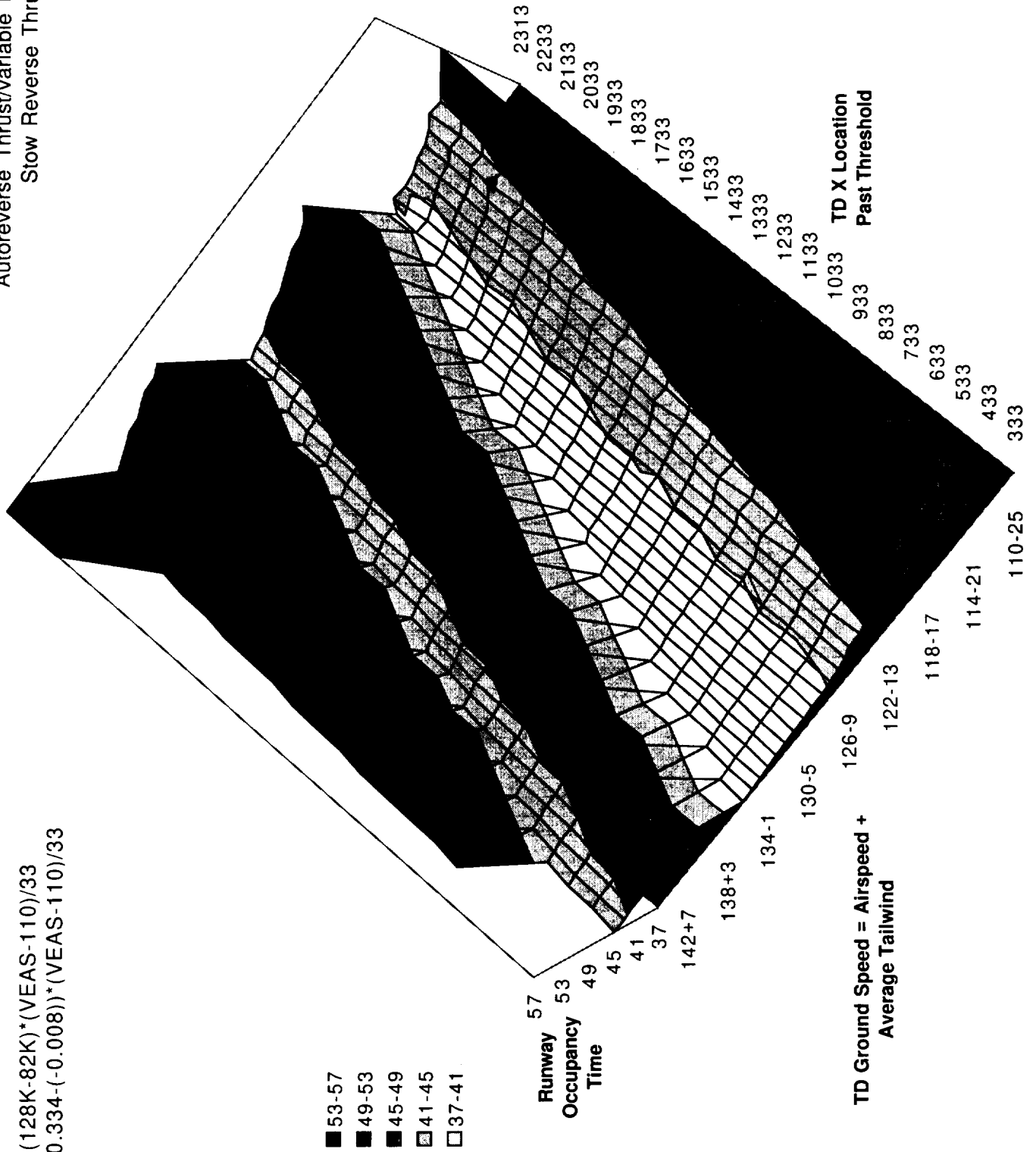


Predict exit prior to TD

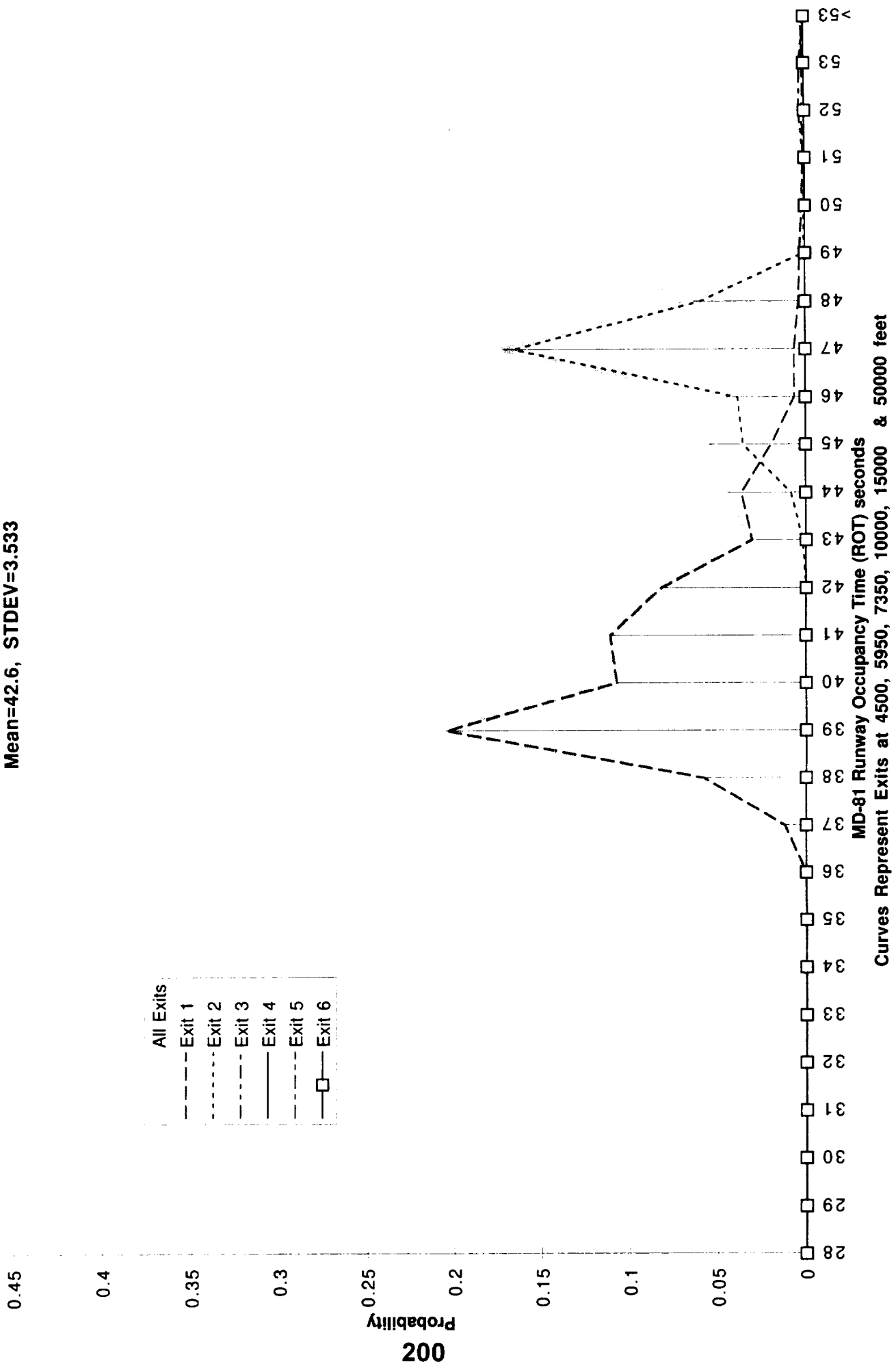
MD-81 ROTO Occupancy Time Snow, Exits=4500,5950,7350,10000,15000,50000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

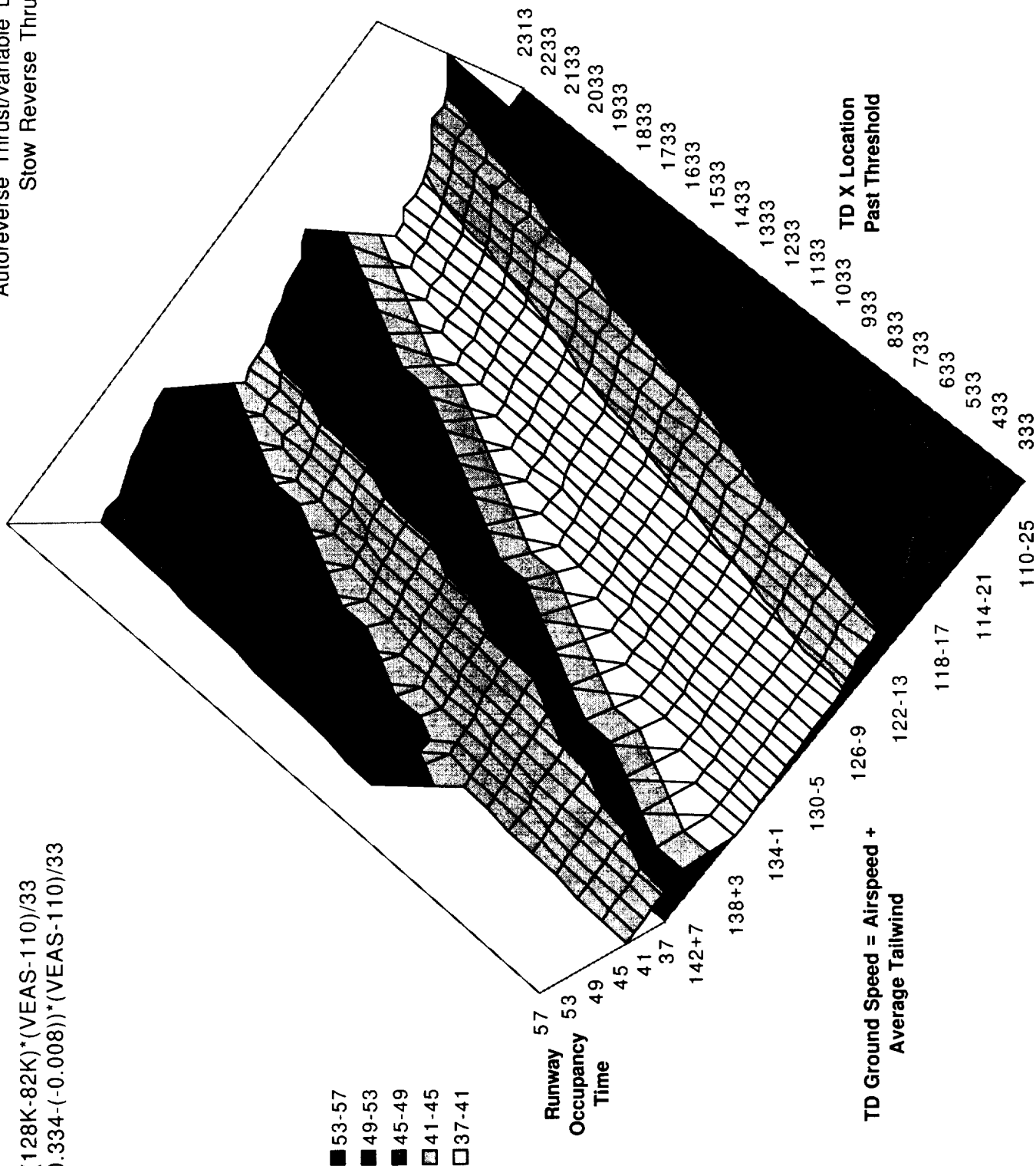


MD-81 ROTO ROT Probability Distribution
 Snow, Auto reverse thrust/variable decel
 Mean=42.6, STDEV=3.533

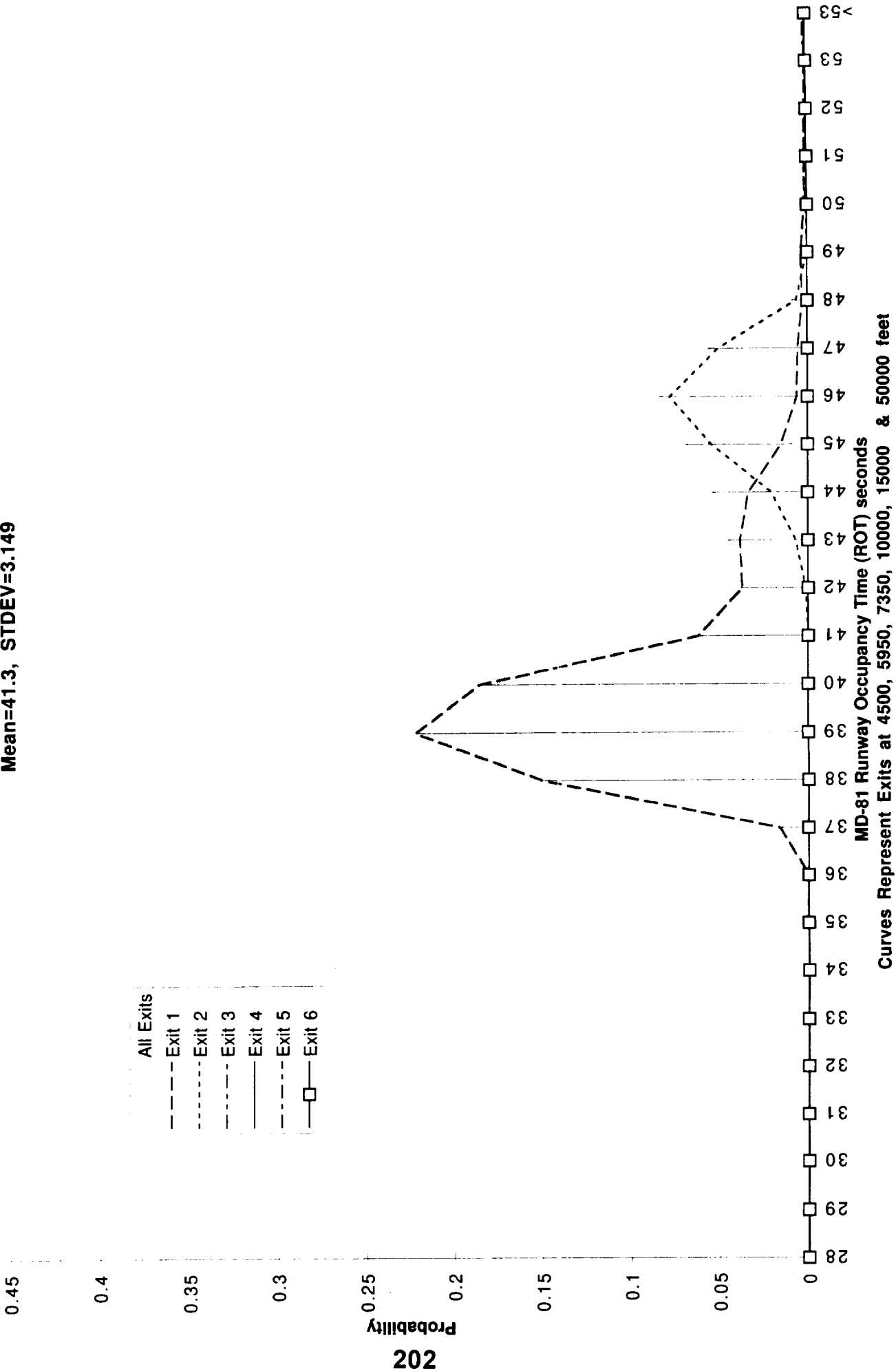


MD-81 ROTO Occupancy Time Slush, Exits=4500, 5950, 7350, 10000, 15000, 50000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

Predict exit prior to TD
 $Weight = 82K + (128K - 82K) * (VEAS - 110) / 33$
 $CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$



MD-81 ROTO ROT Probability Distribution
 Slush, Auto reverse thrust/variable decel
 Mean=41.3, STDEV=3.149



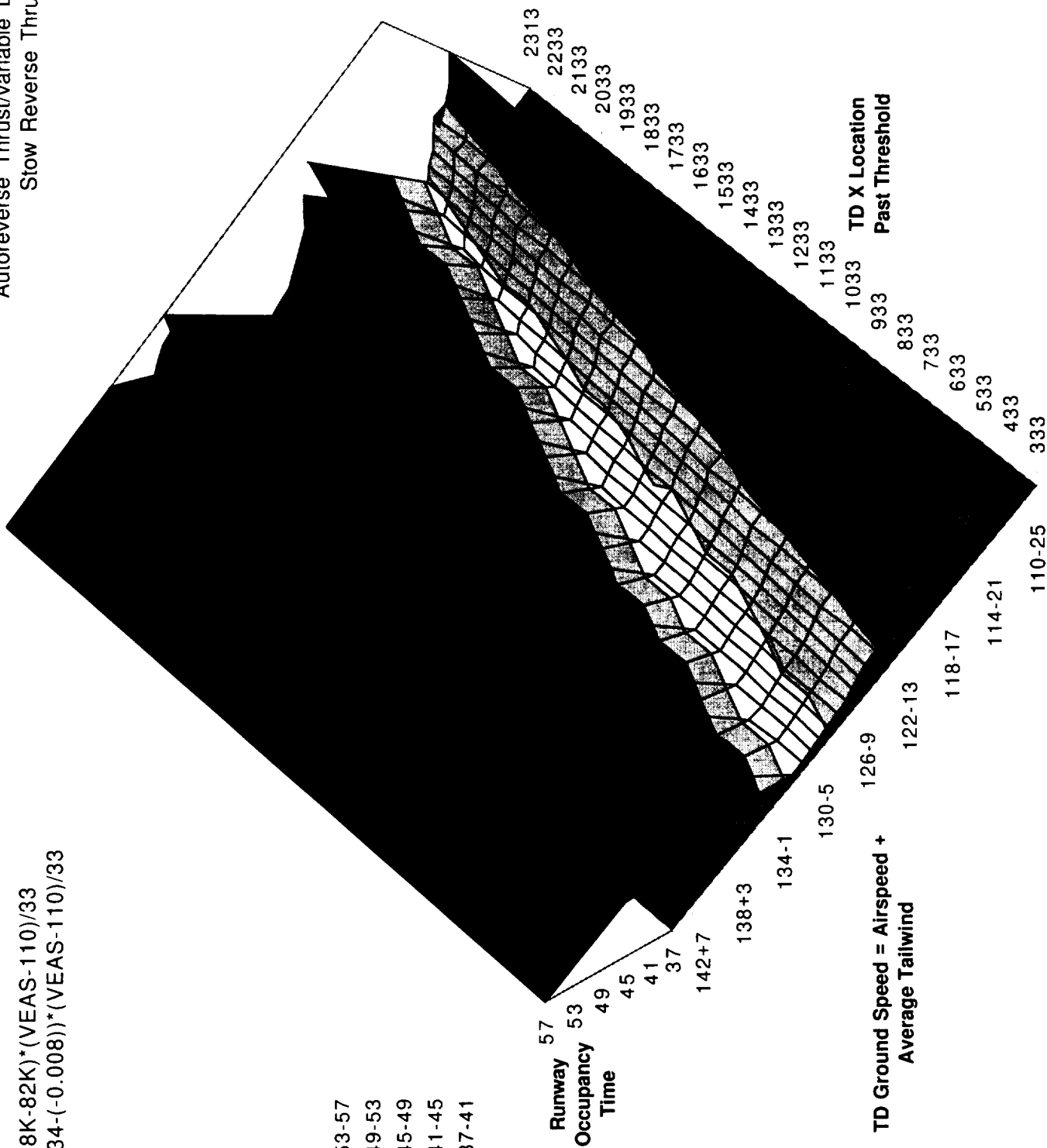
Predict exit prior to TD

MD-81 ROTO Occupancy Time Flood, Exits=4500,5950,7350,10000,15000,50000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust=70 kt gd

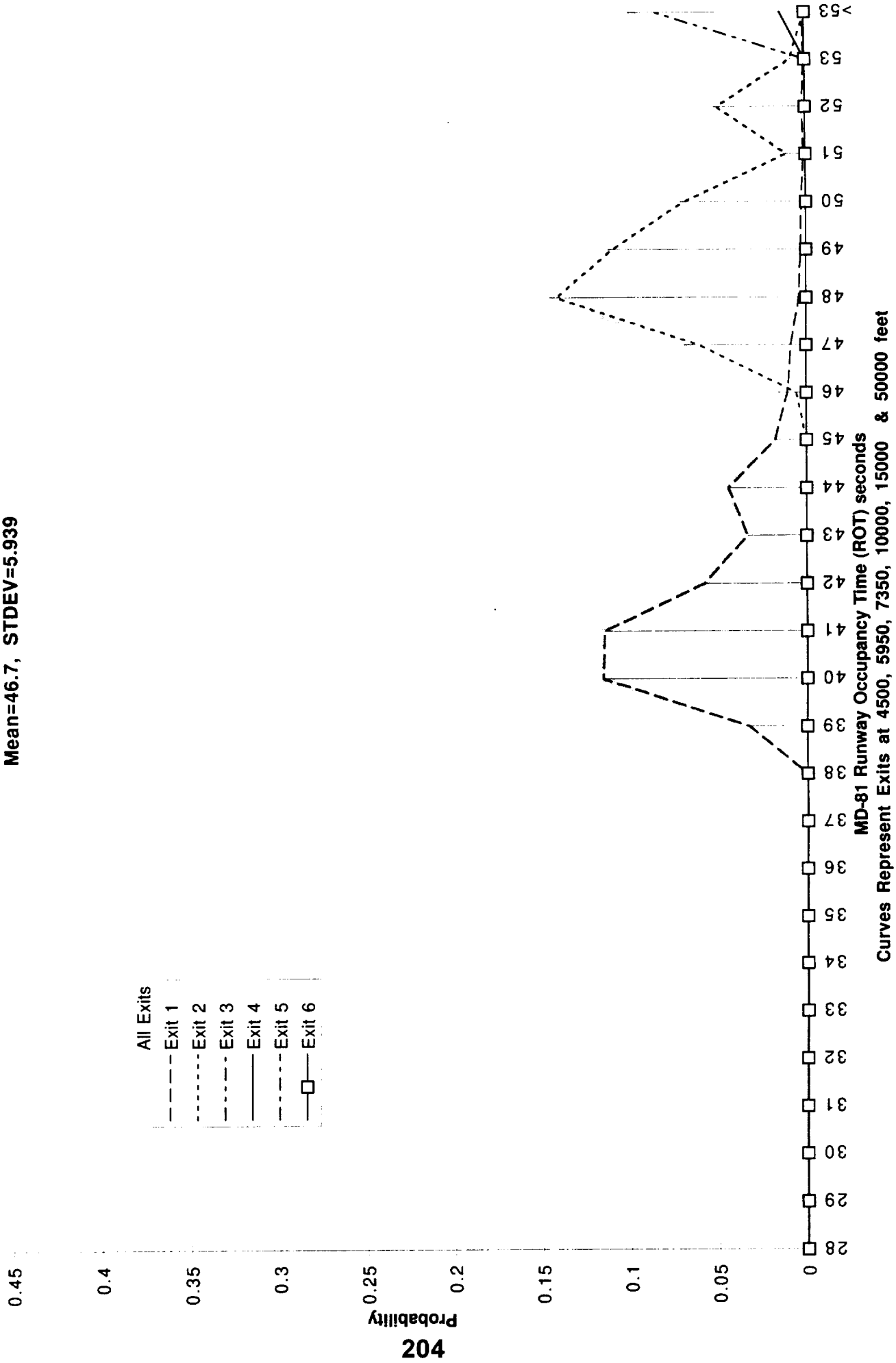
$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



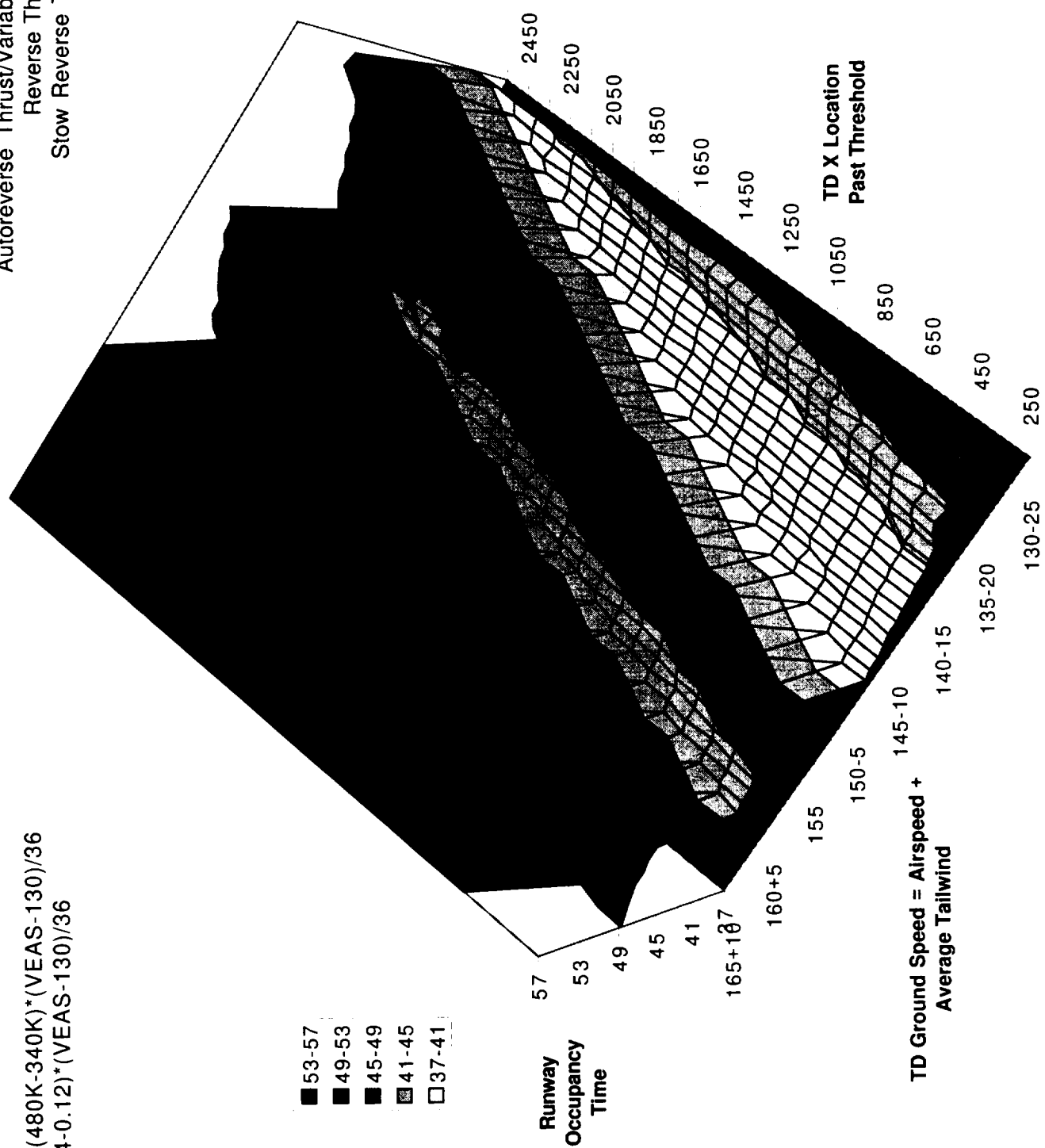
MD-81 ROTO ROT Probability Distribution
 Flood, Auto reverse thrust/variable decel
 Mean=46.7, STDEV=5.939



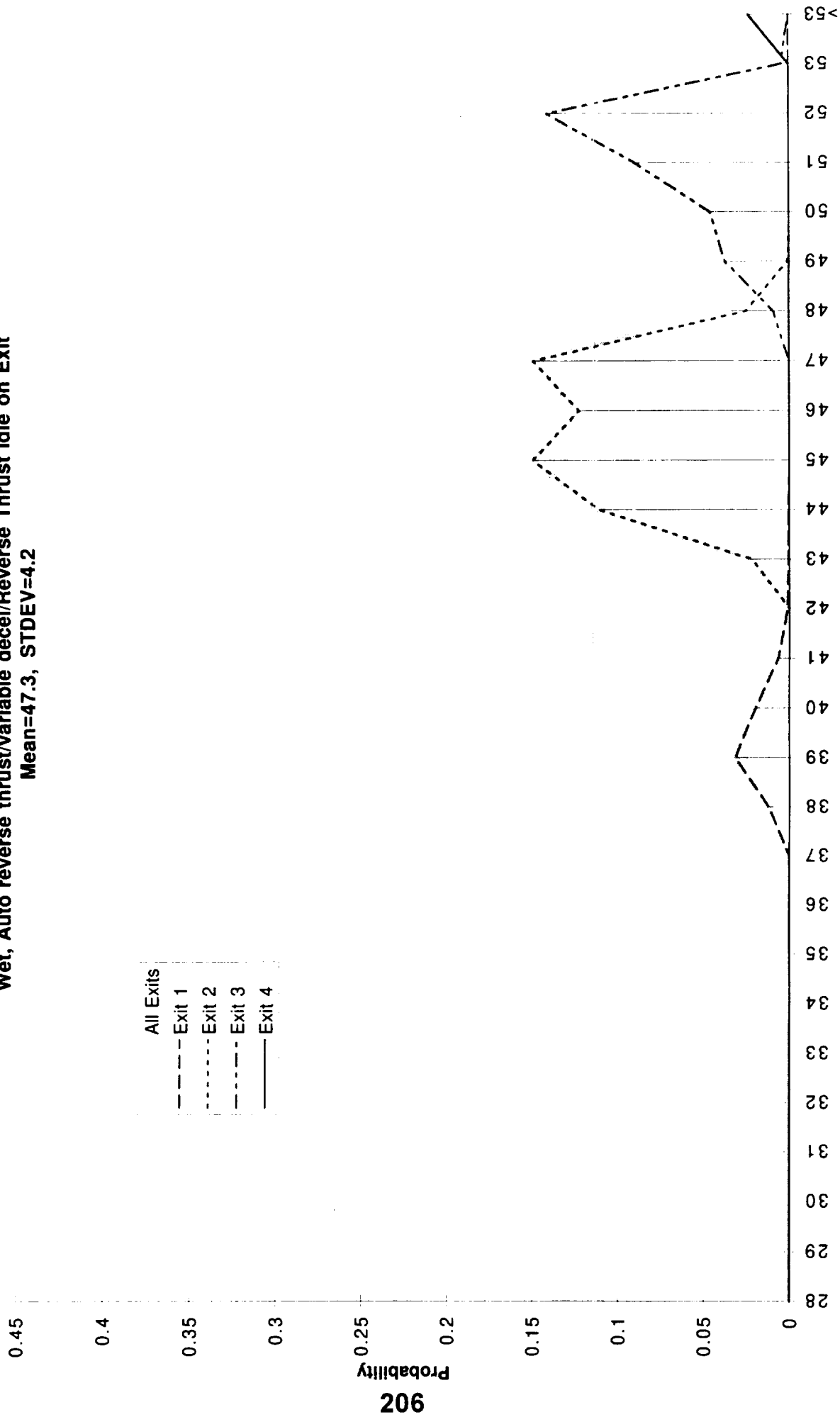
Wet, Exits=4500, 5950, 7350, 10000
 Autoreverse Thrust/Variable Deceleration
 Reverse Thrust Idle on Exit
 Stow Reverse Thrust=70 kt gd

MD-11 ROTO Occupancy Time

Predict exit prior to TD
 $Weight = 340K + (480K - 340K) * (VEAS - 130) / 36$
 $CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Reverse Thrust Idle on Exit
Mean=47.3, STDEV=4.2



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

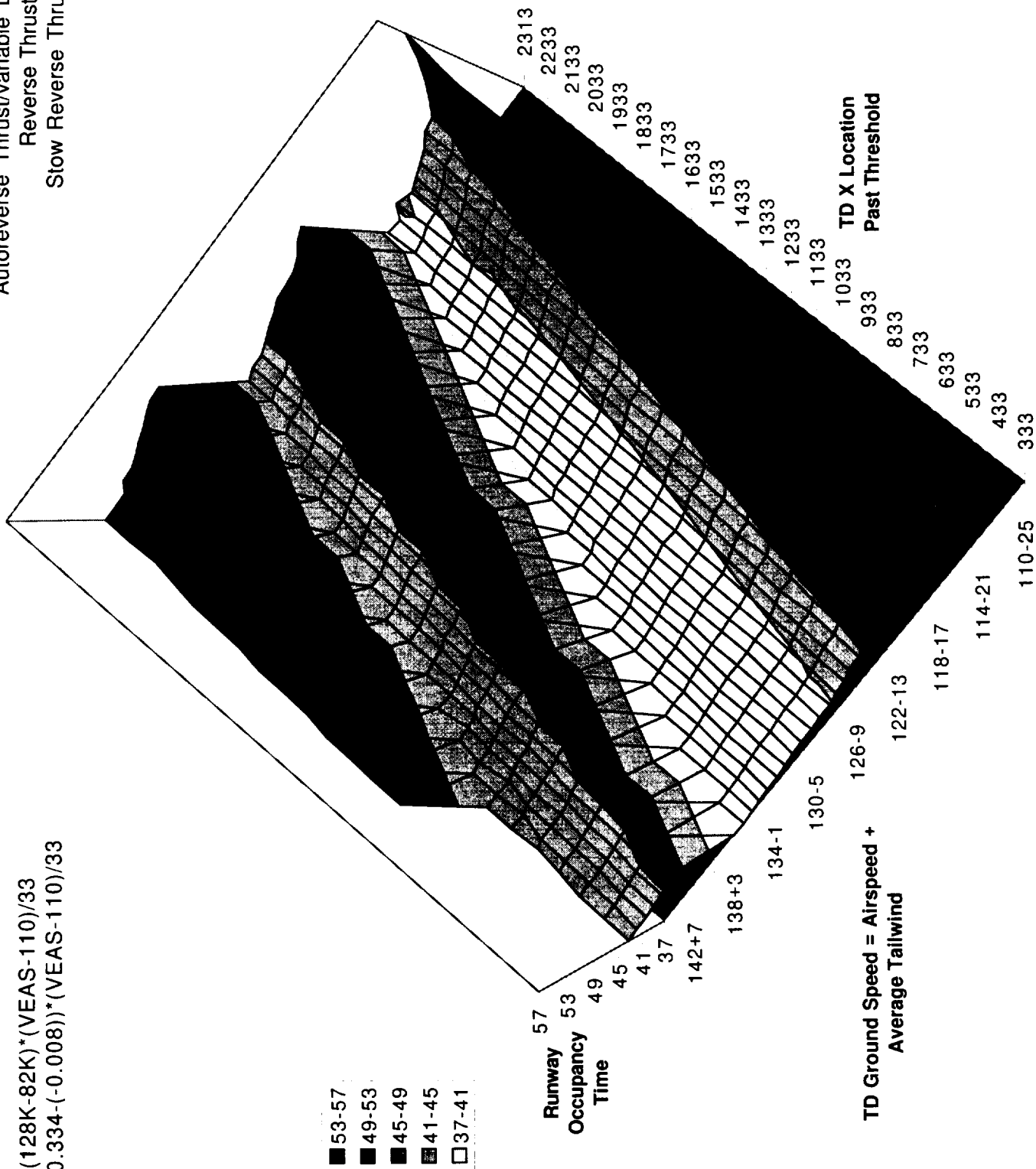
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

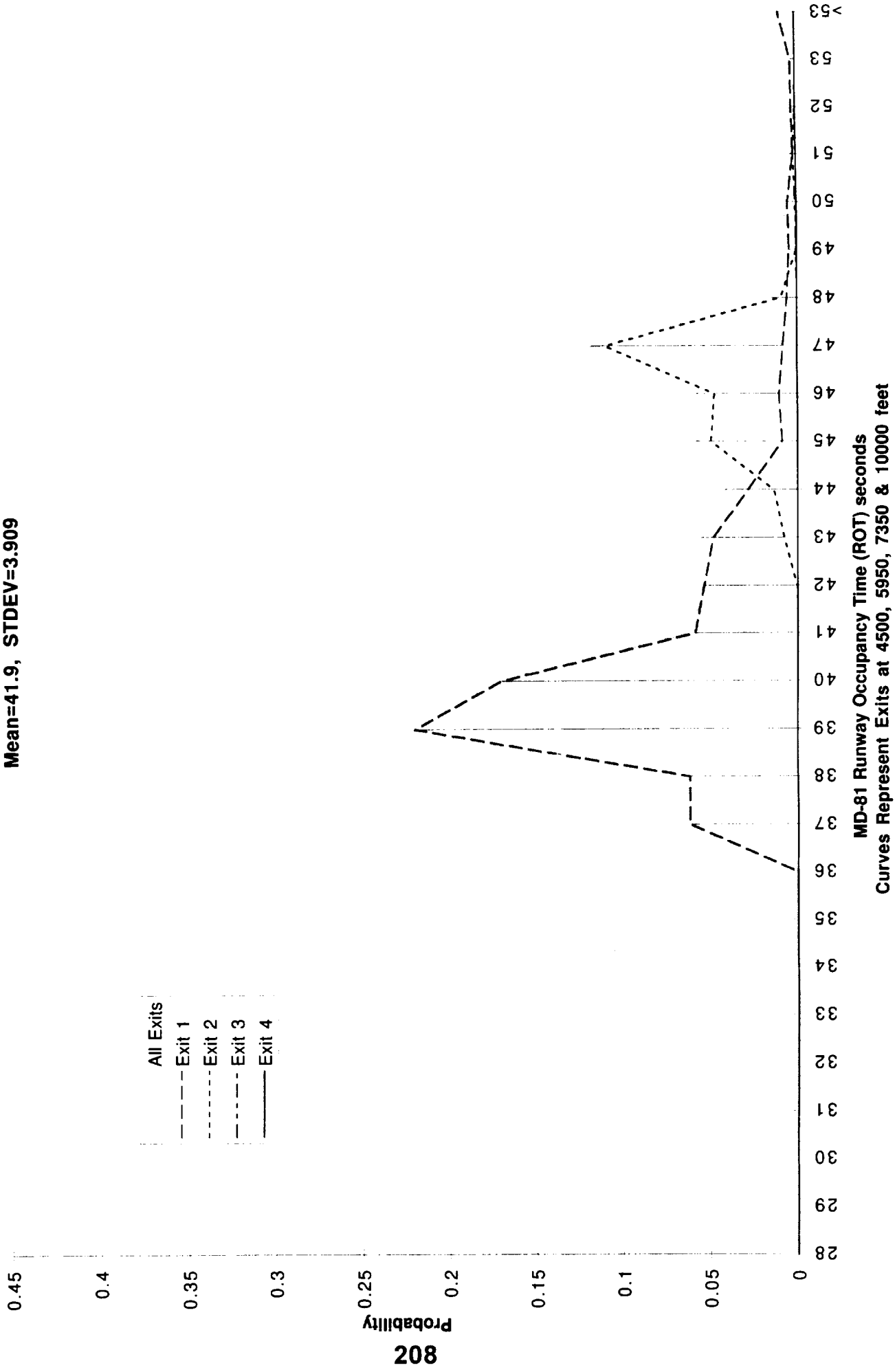
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Reverse Thrust Idle on Exit
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Reverse Thrust Idle on Exit
Mean=41.9, STDEV=3.909



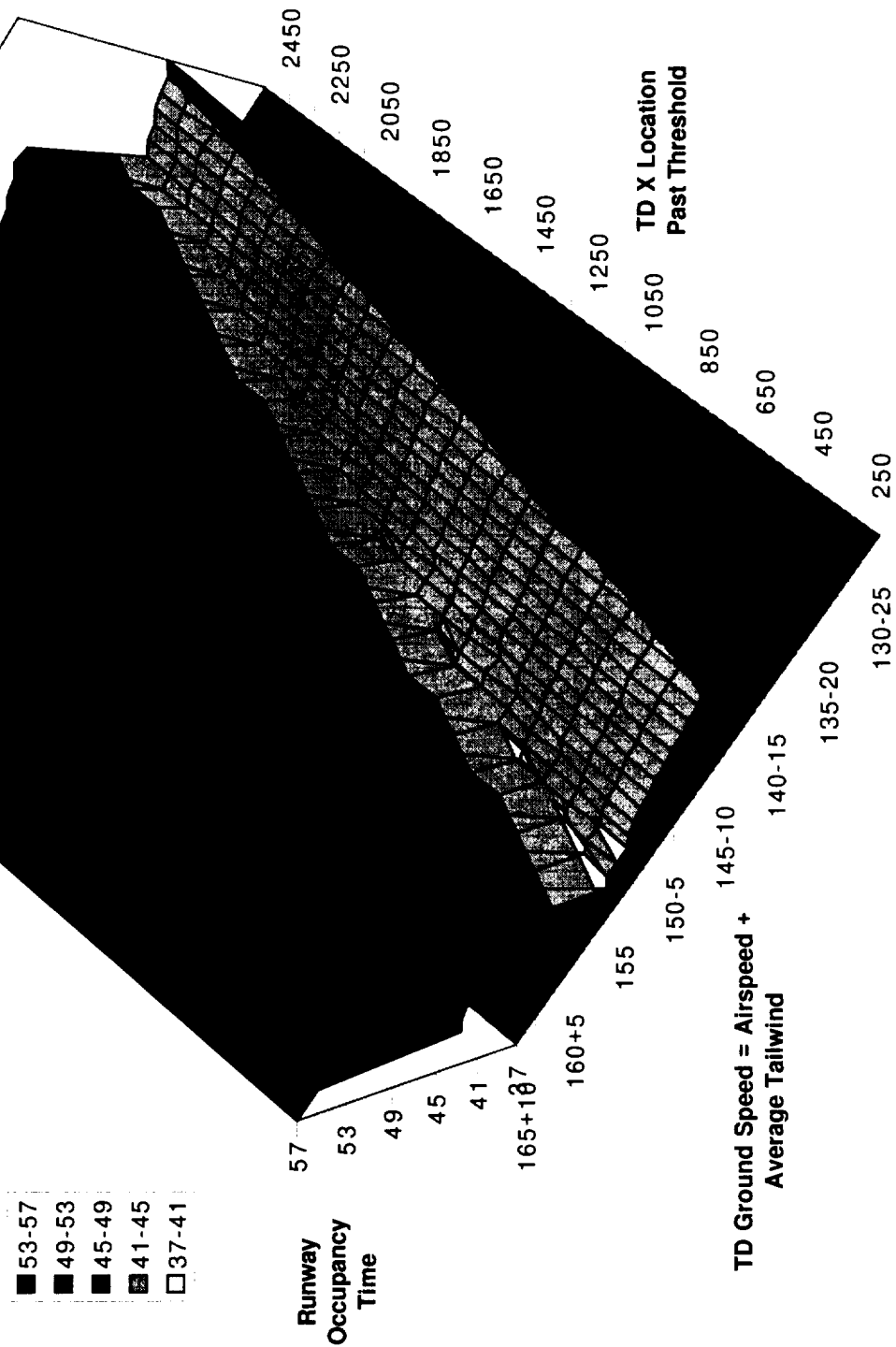
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

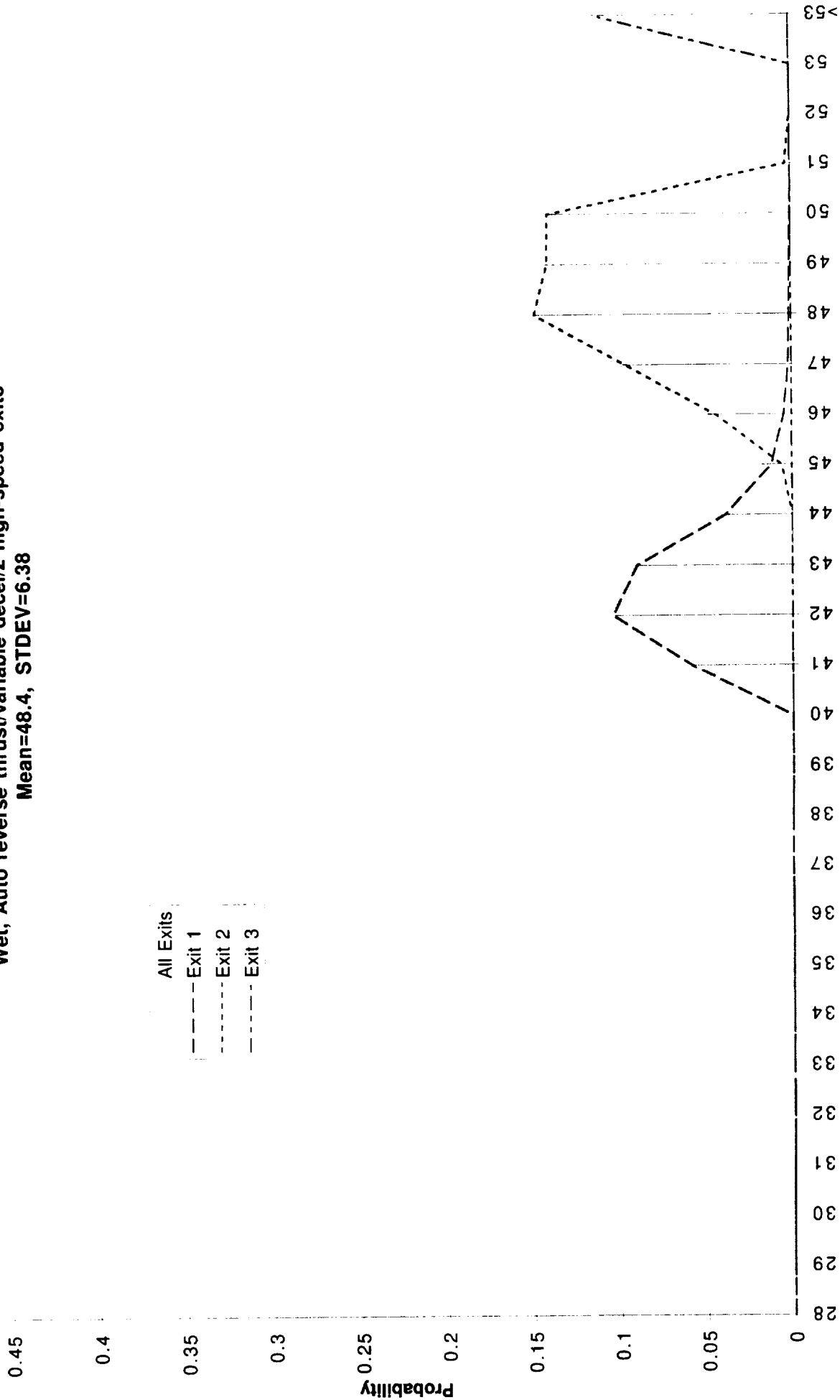
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=5225, 6650, 10000
Autoreverse Thrust/Variable Deceleration
2 high-speed exits
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
 Wet, Auto reverse thrust/variable decel/2 high-speed exits
 Mean=48.4, STDEV=6.38



MD-11 Runway Occupancy Time (ROT) seconds
 Curves Represent Exits at 5225, 6650 & 10000 feet

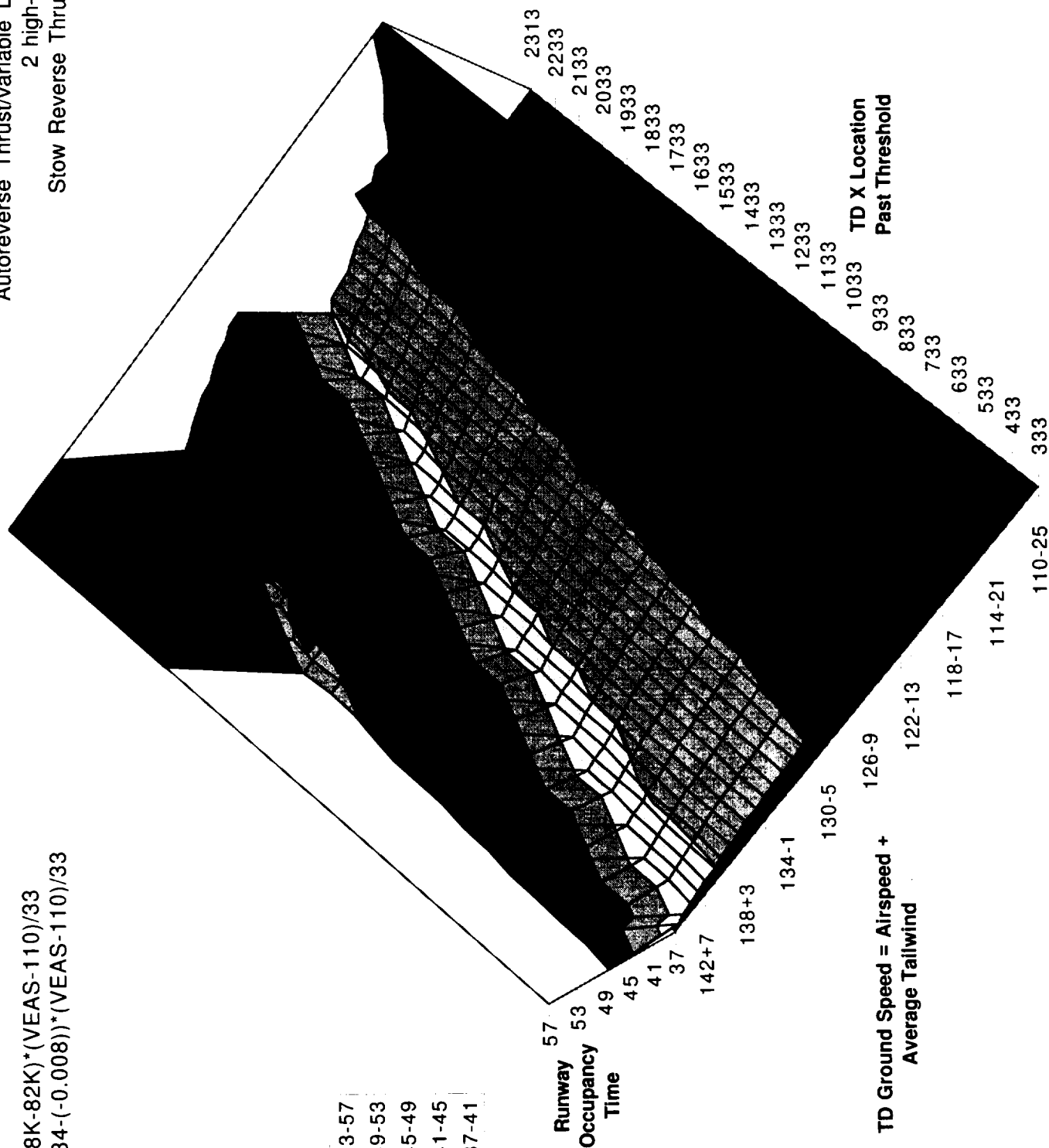
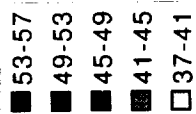
Wet, Exits=5225, 6650, 10000
 Autoreverse Thrust/variable Deceleration
 2 high-speed exits
 Stow Reverse Thrust=70 kt/gd

MD-81 ROTO Occupancy Time

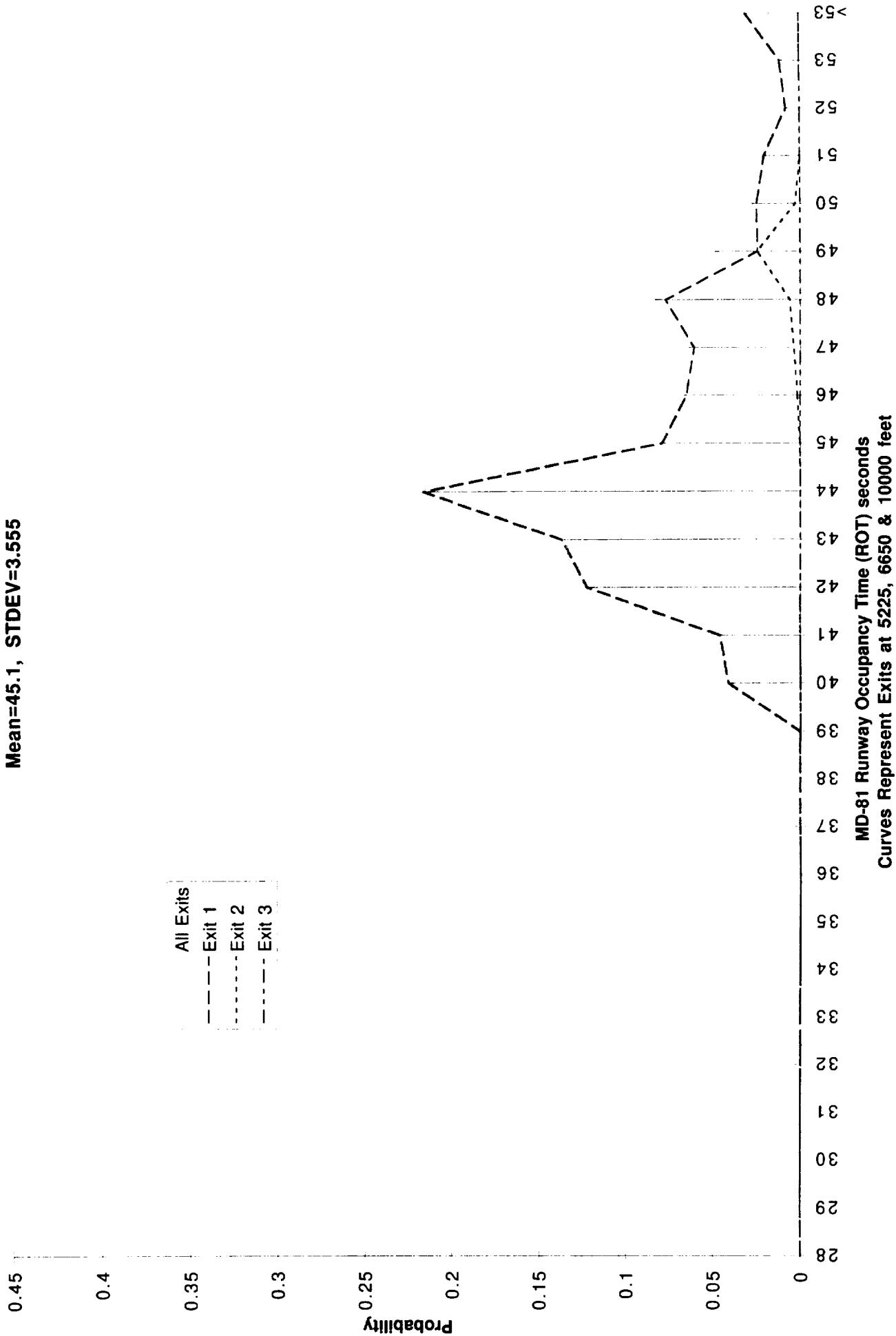
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/2 high-speed exits
Mean=45.1, STDEV=3.555



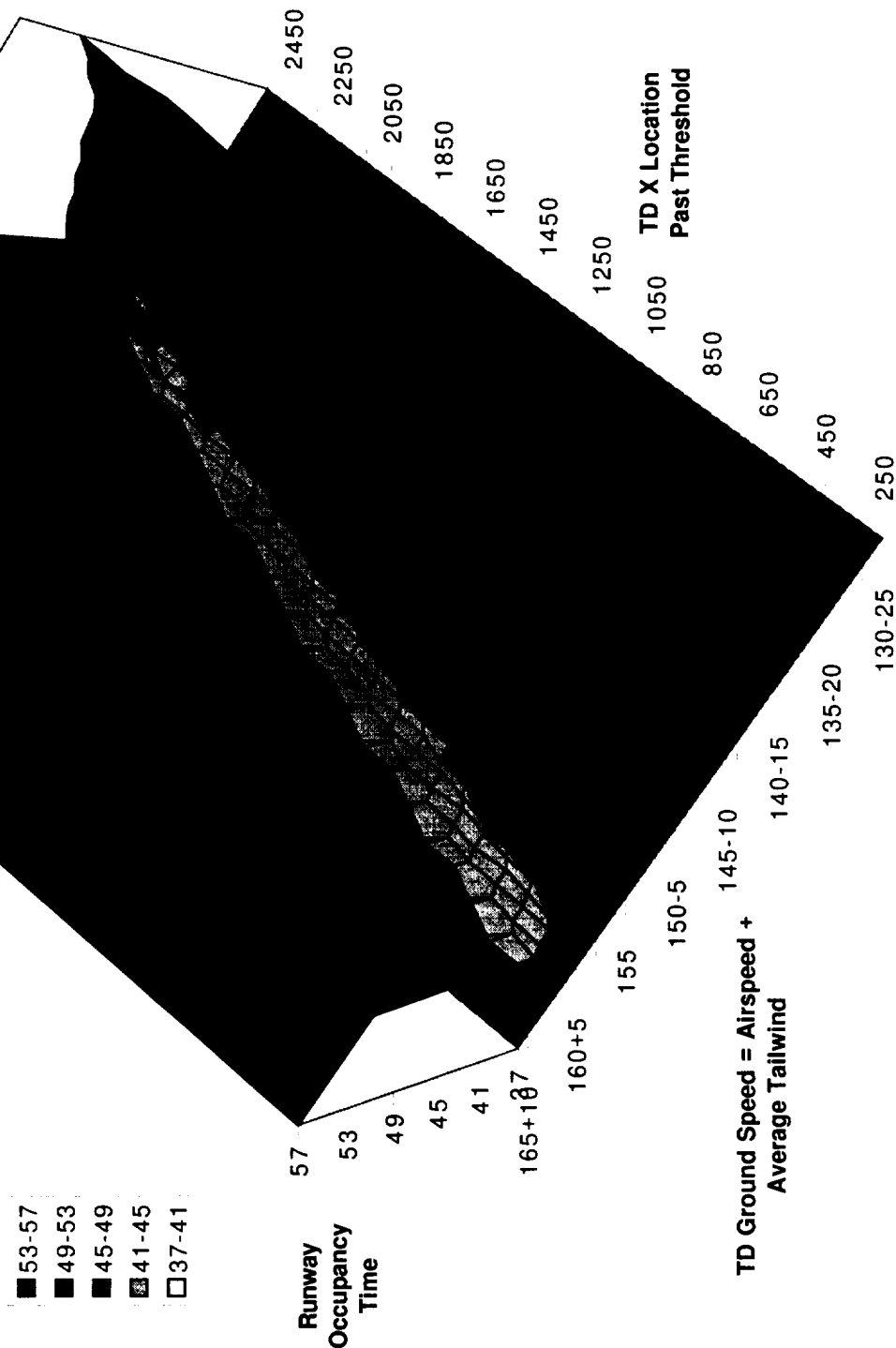
Wet, Exits=5950, 10000
 Autoreverse Thrust/Variable Deceleration
 1 high-speed exit
 Stow Reverse Thrust=70 kt/gd

MD-11 ROTO Occupancy Time

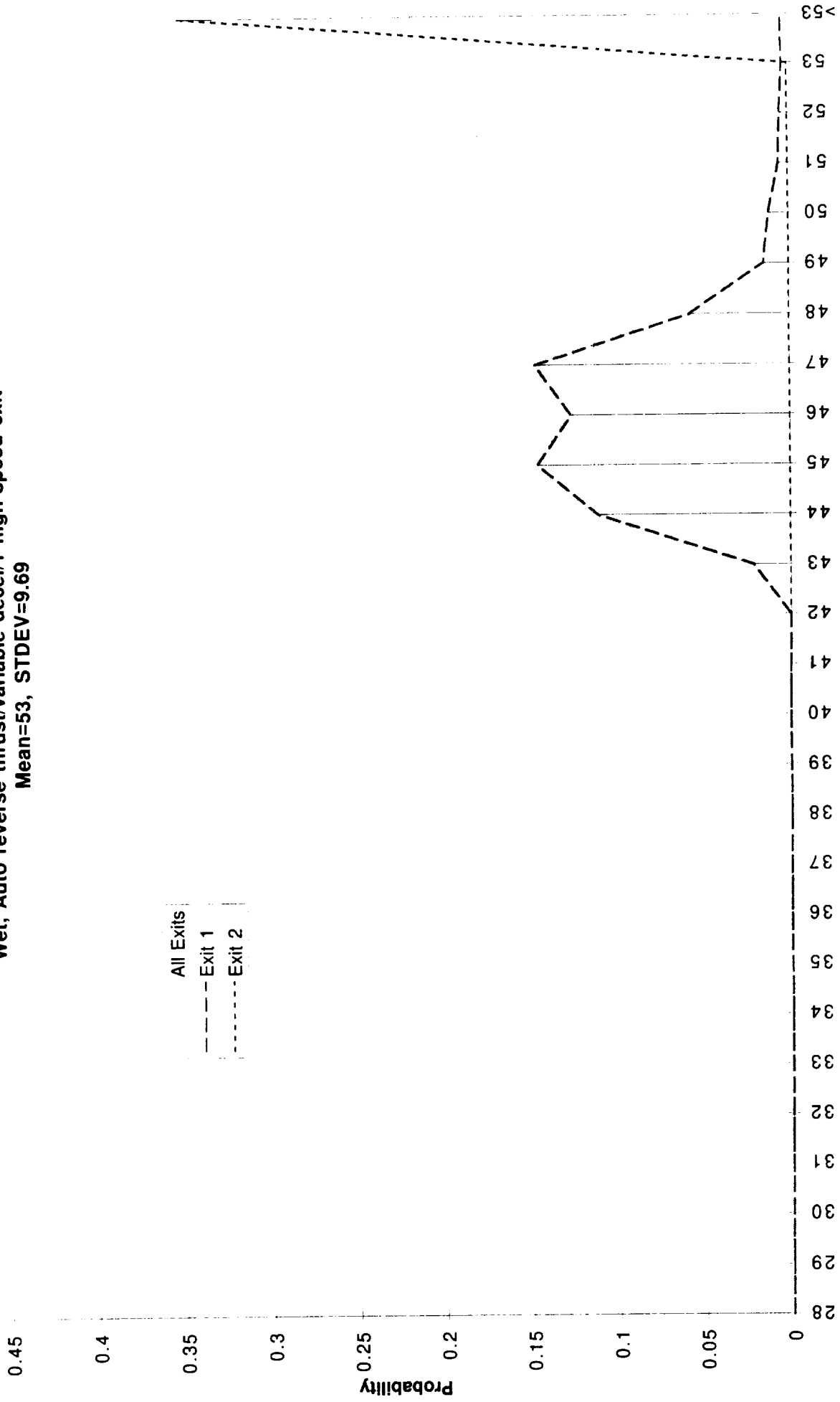
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
 Wet, Auto reverse thrust/variable decel/1 high-speed exit
 Mean=53, STDEV=9.69



MD-11 Runway Occupancy Time (ROT) seconds
 Curves Represent Exits at 5950 & 10000 feet

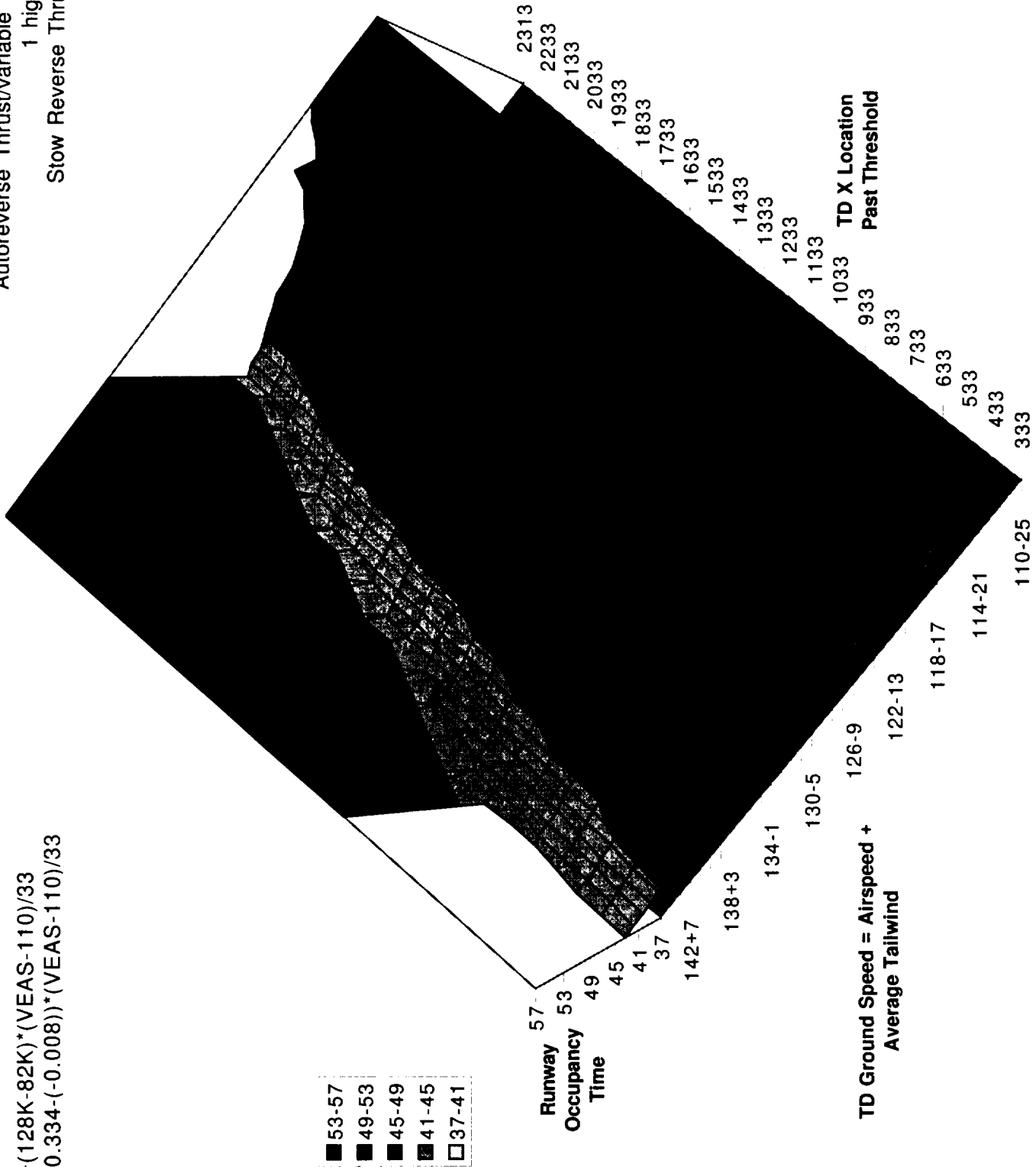
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

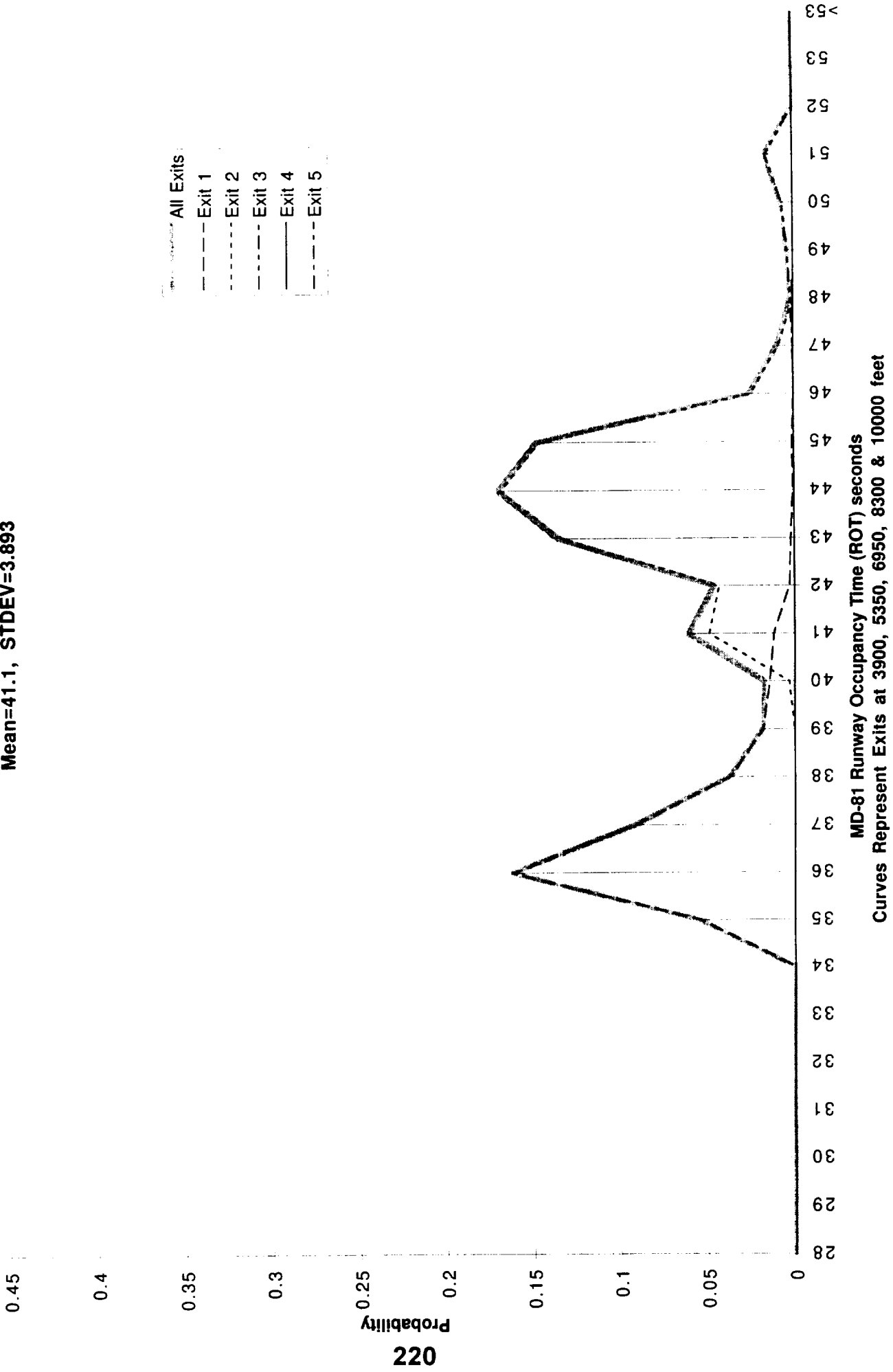
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=5950, 10000
 Autoreverse Thrust/variable Deceleration
 1 high-speed exit
 Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/4th exit location at 8300
Mean=41.1, STDEV=3.893



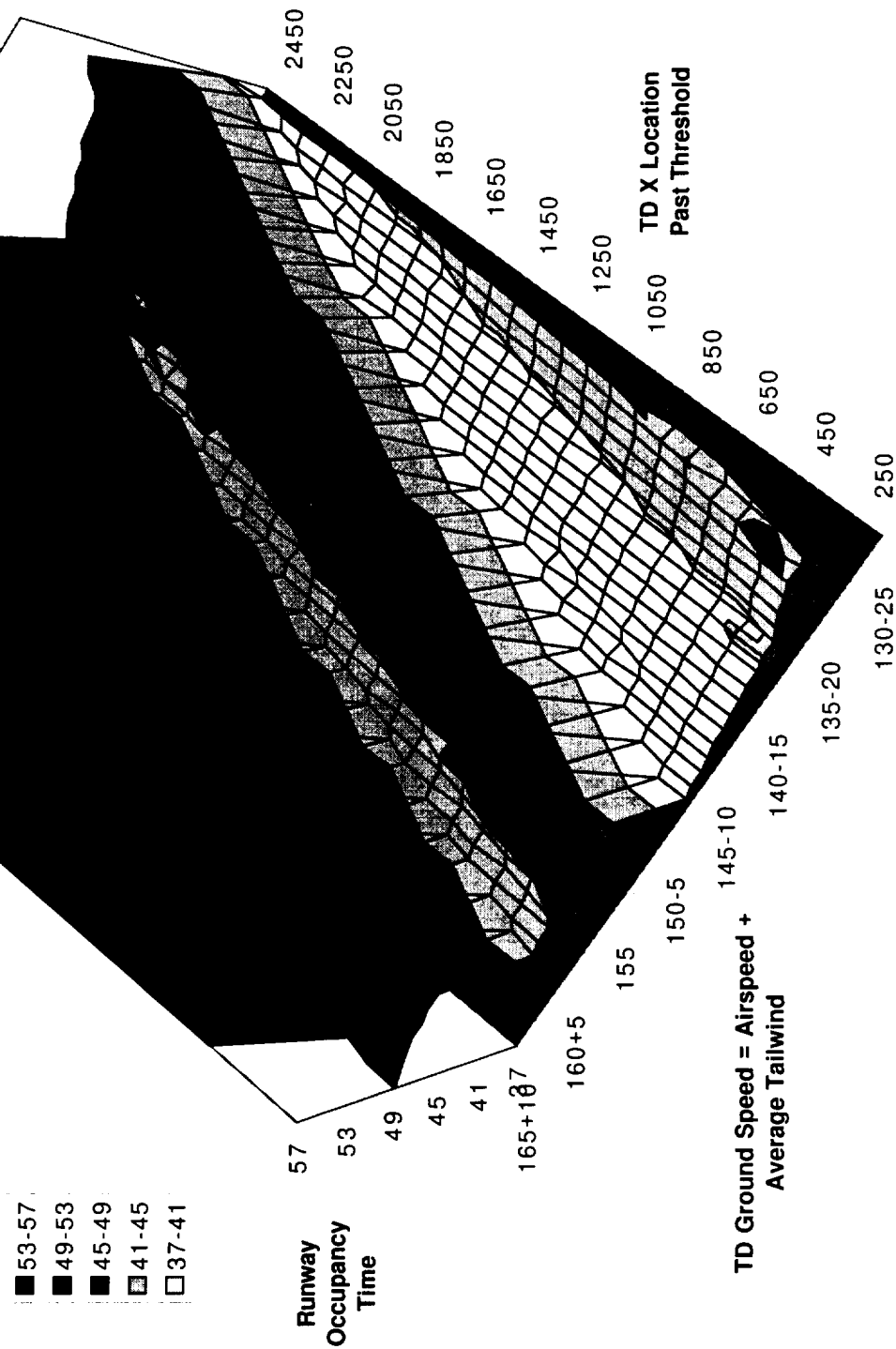
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

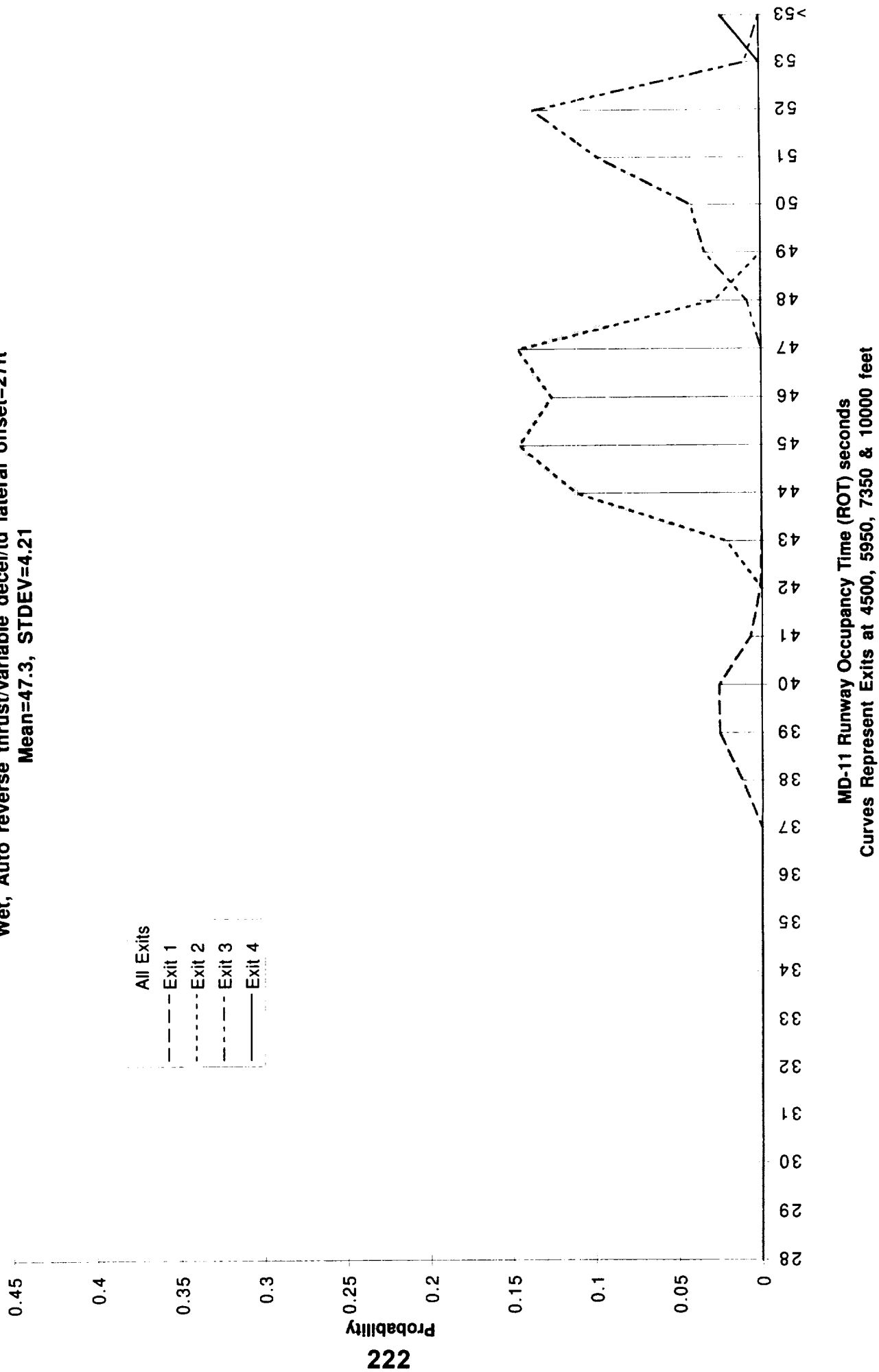
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Touchdown lateral offset=27ft
Stow Reverse Thrust=70 kt gd

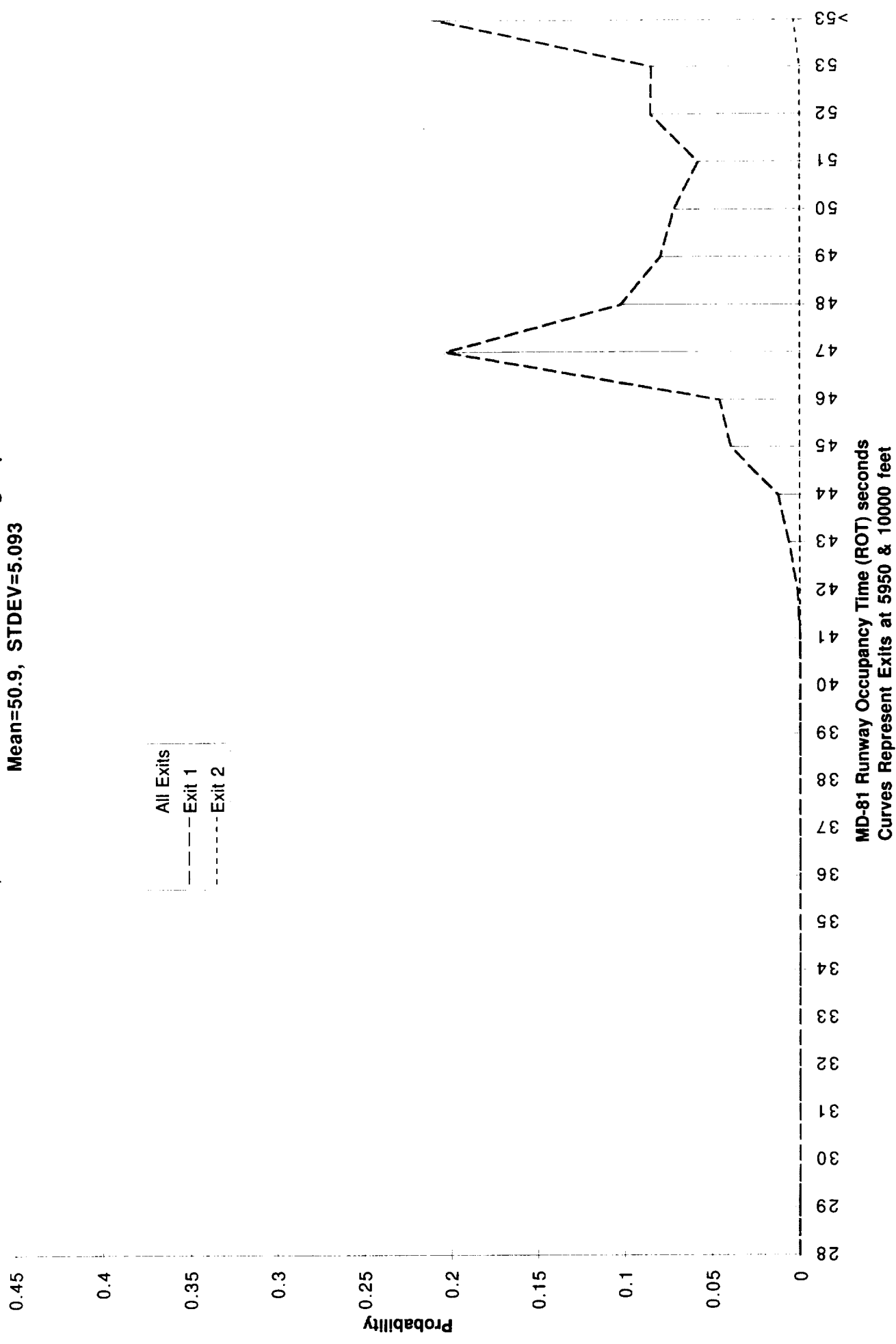


MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/td lateral offset=27ft
Mean=47.3, STDEV=4.21



MD-81 Runway Occupancy Time Probability Distribution
 Wet, Auto reverse thrust/variable decel/1 high-speed exit
 Mean=50.9, STDEV=5.093

All Exits
 Exit 1
 Exit 2



Wet, Exits=3900,5350,6950,8300,10000
 Autoreverse Thrust/variable Deceleration
 4th Exit Location at 8300
 Stow Reverse Thrust=70 kt gd

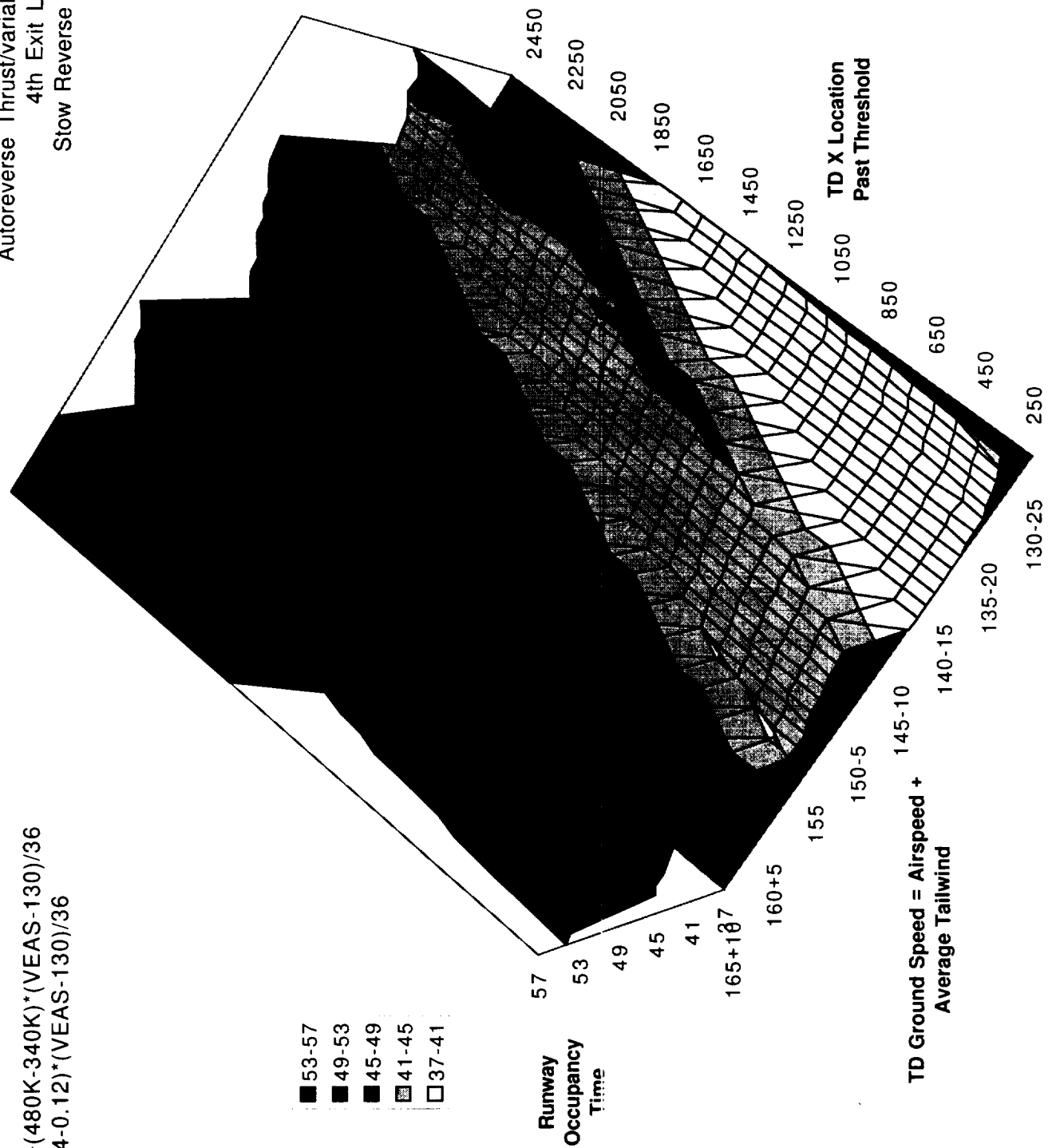
MD-11 ROTO Occupancy Time

Predict exit prior to TD

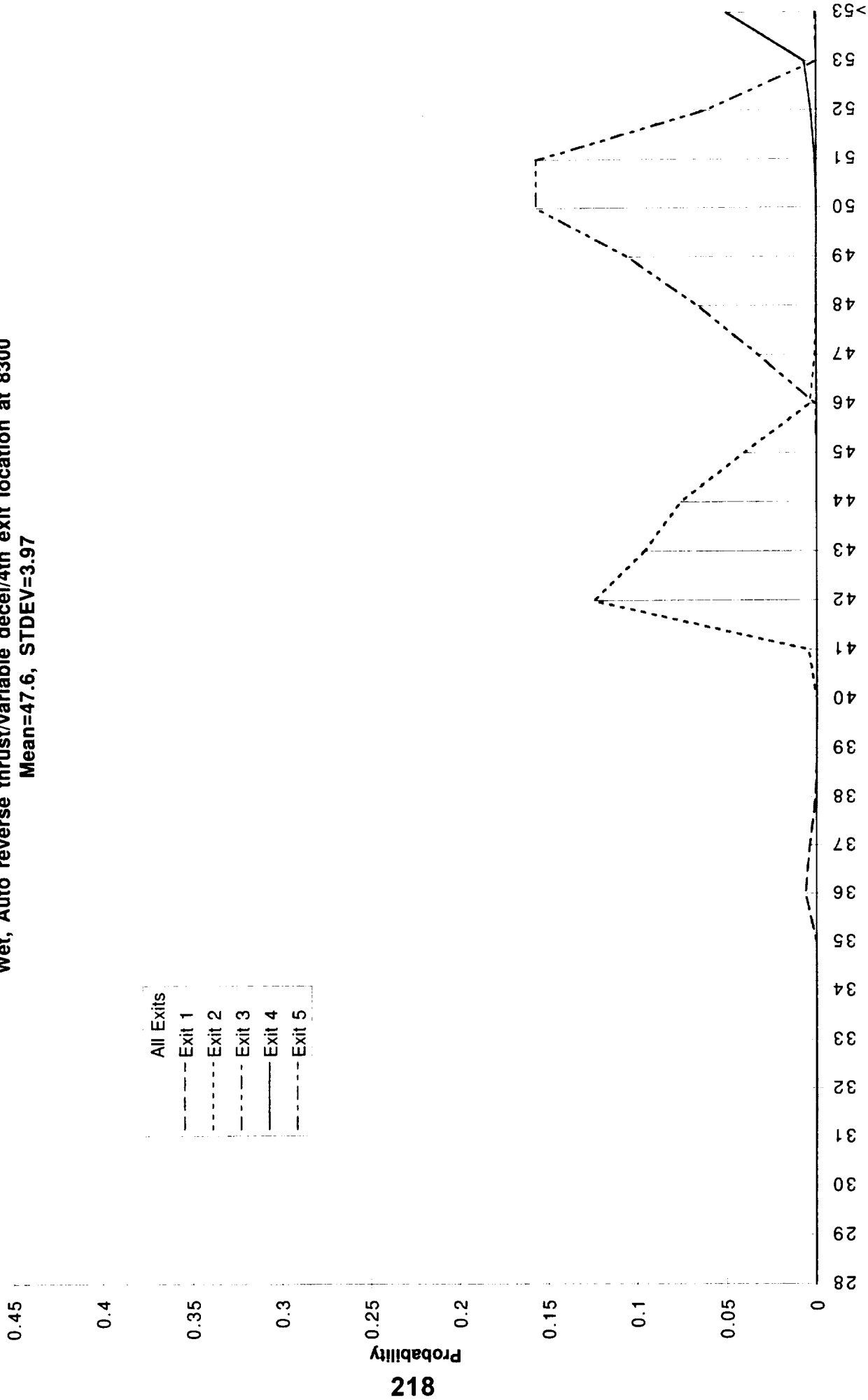
$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$

$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-11 ROTU ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/4th exit location at 8300
Mean=47.6, STDEV=3.97



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3900, 5350, 6950, 8300 & 10000 feet

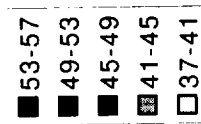
Wet, Exits=3900, 5350, 6950, 8300, 10000
 Autoreverse Thrust/variable Deceleration
 4th Exit Location at 8300
 Stow Reverse Thrust=70 kt gd

MD-81 ROTO Occupancy Time

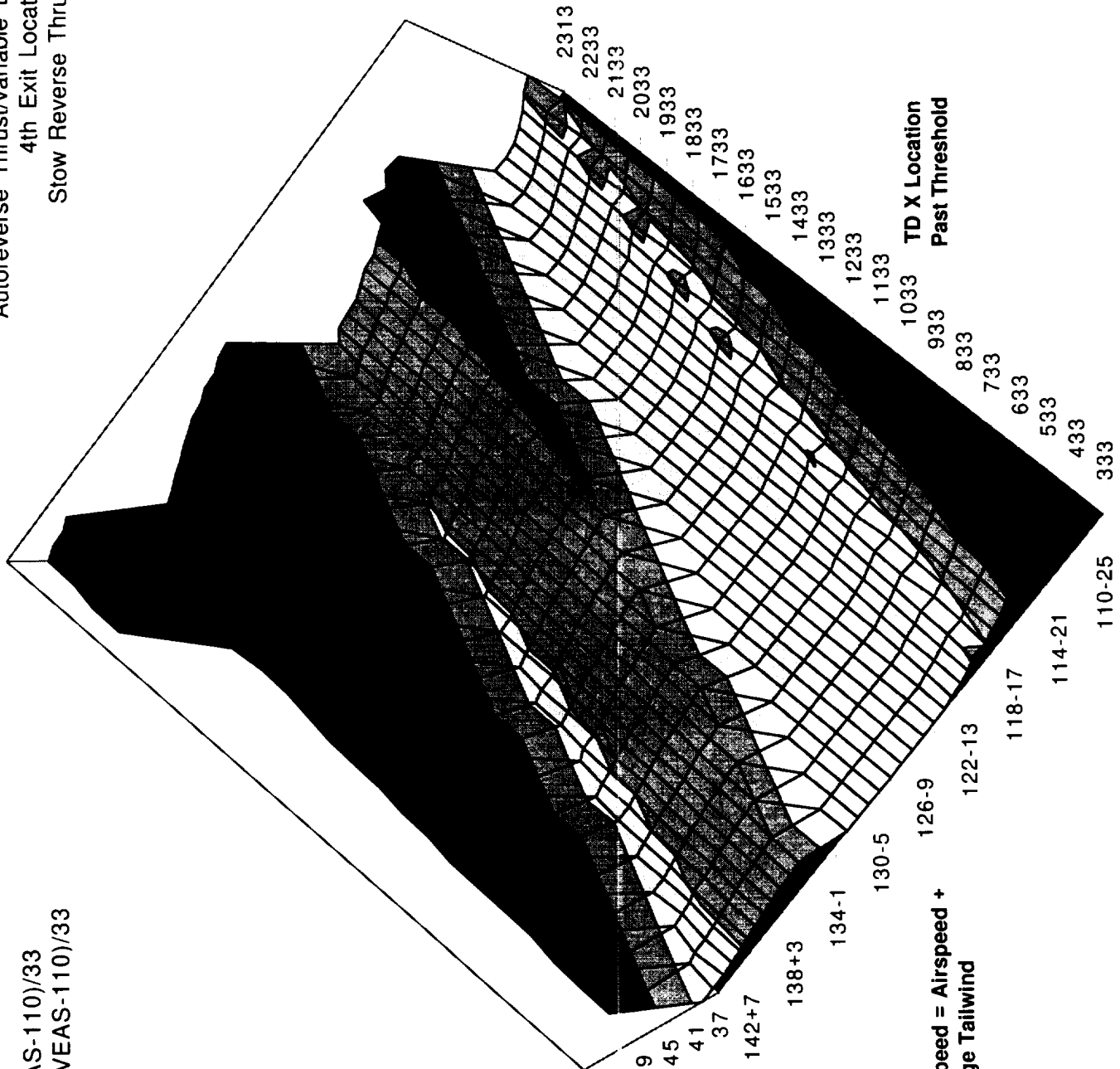
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$



Runway
Occupancy
Time



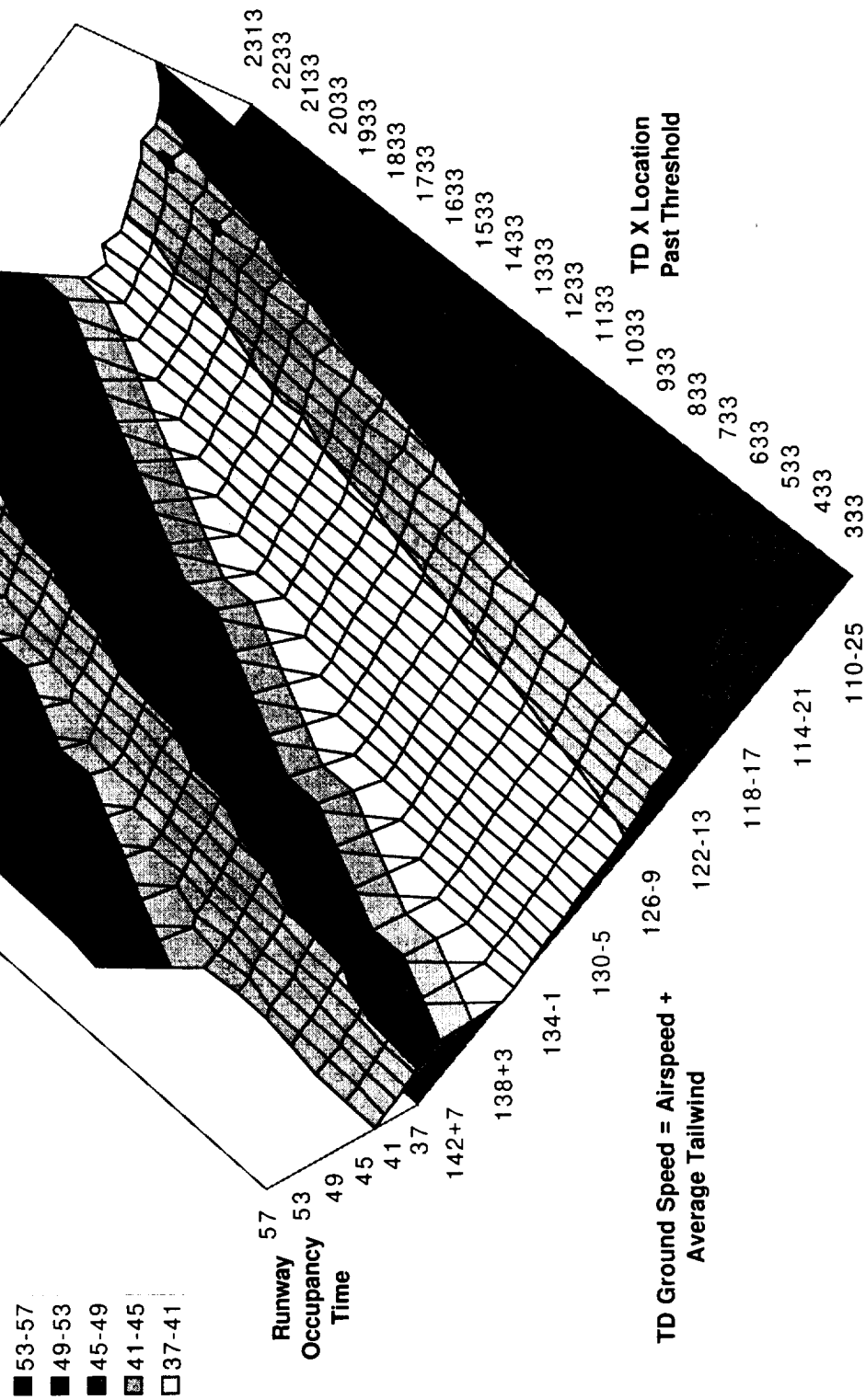
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

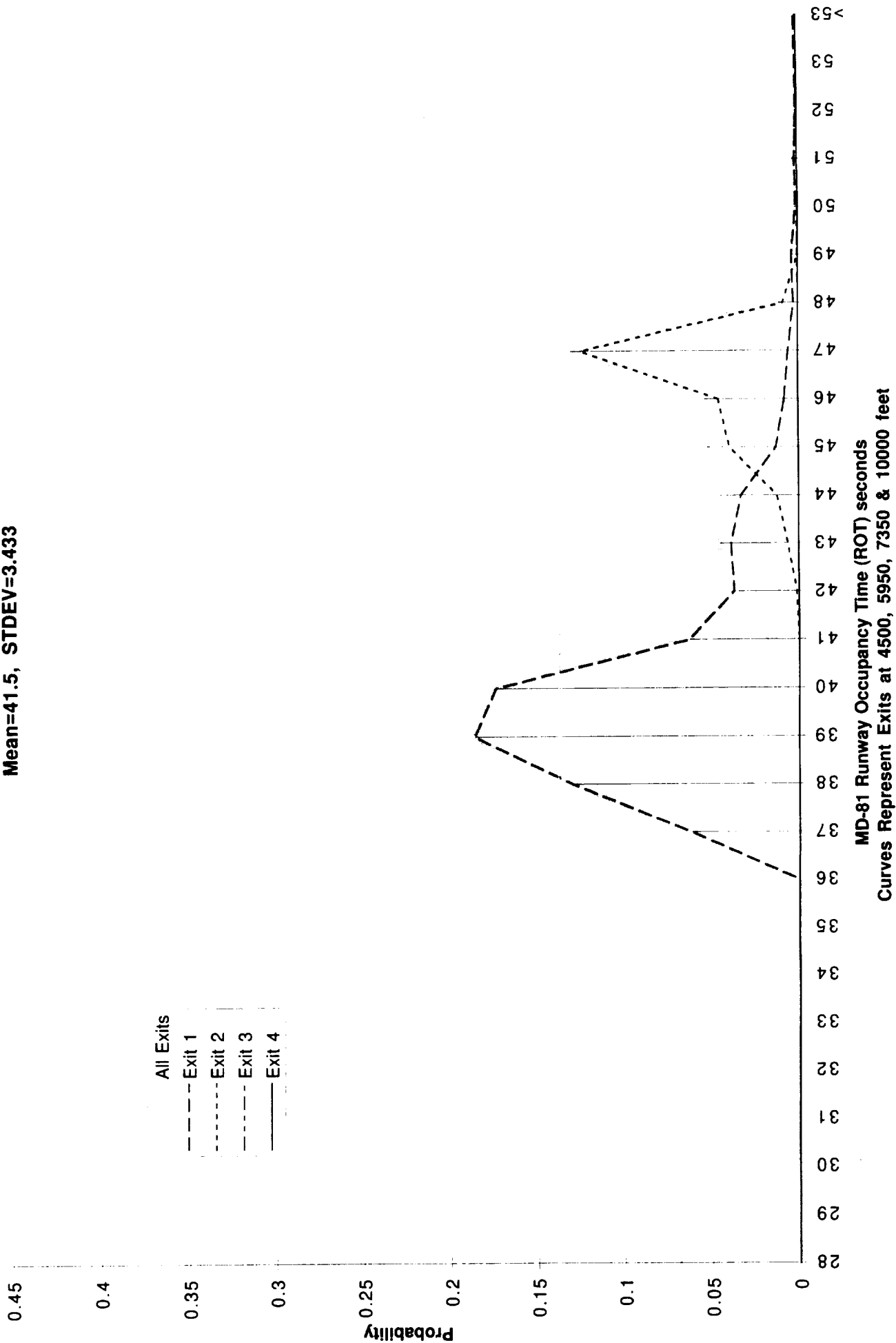
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Touchdown lateral offset=27ft
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/td lateral offset=27ft
Mean=41.5, STDEV=3.433



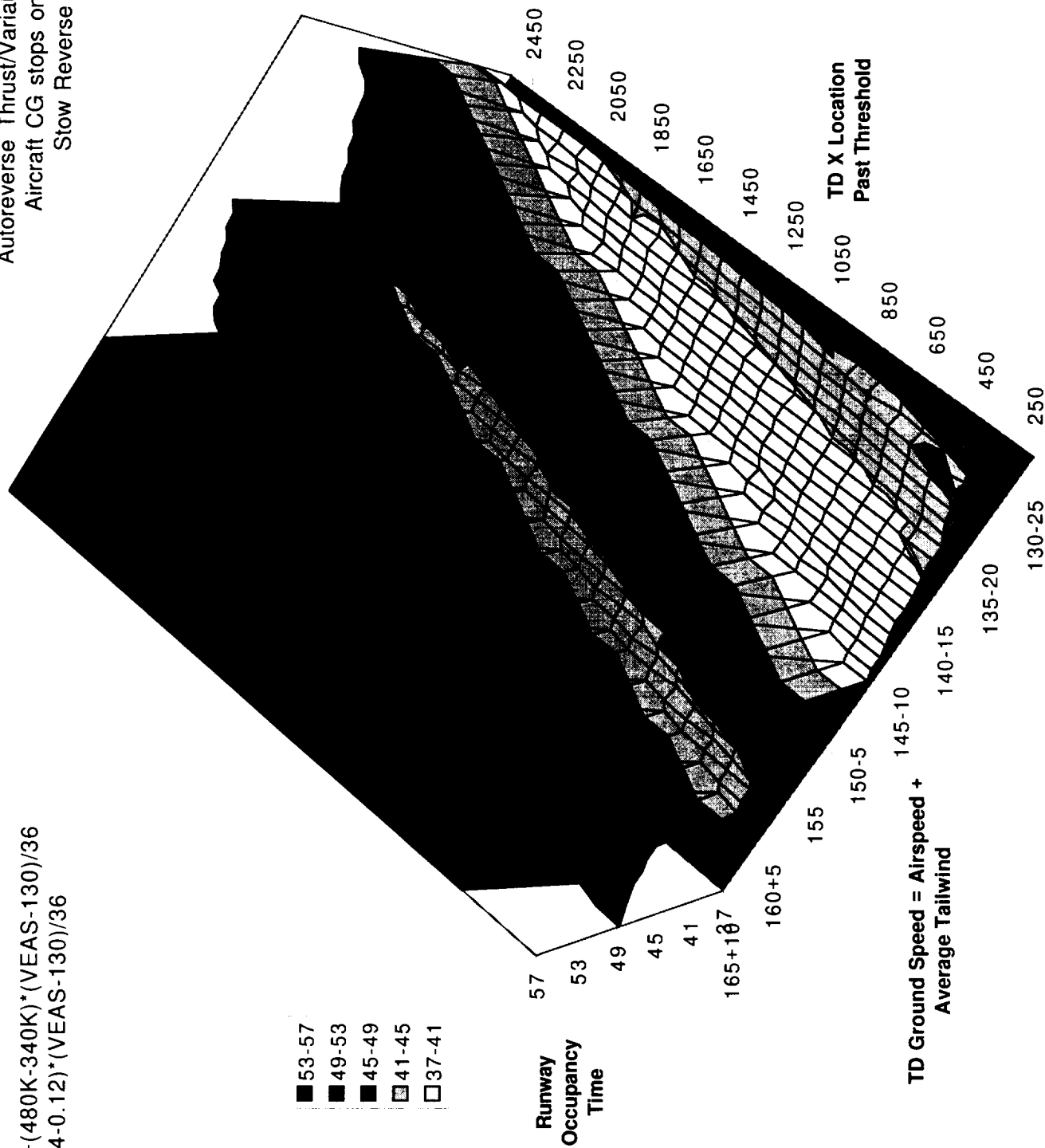
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

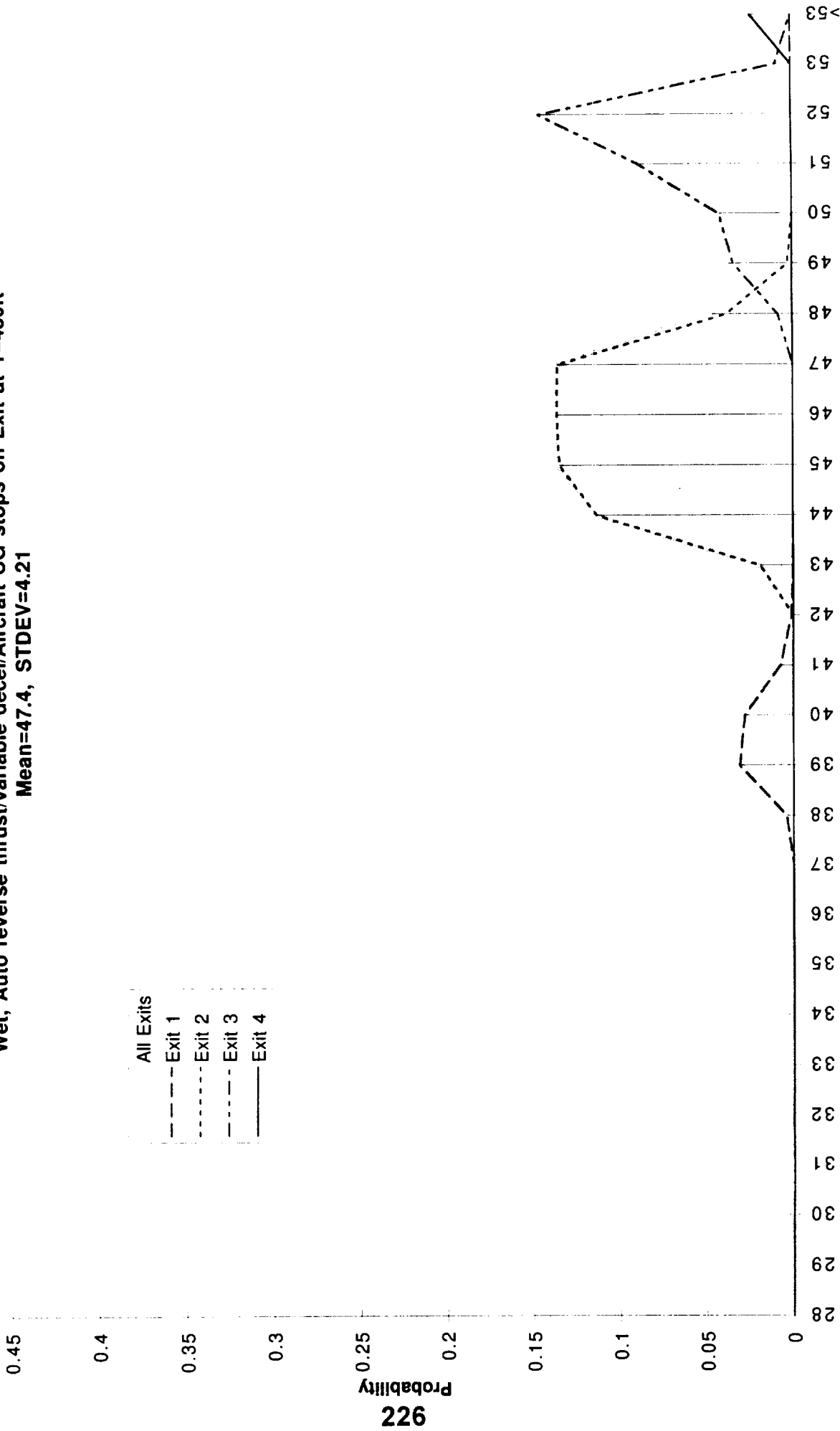
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Aircraft CG stops on Exit at Y=480ft
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Aircraft CG stops on Exit at Y=480ft
Mean=47.4, STDEV=4.21



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

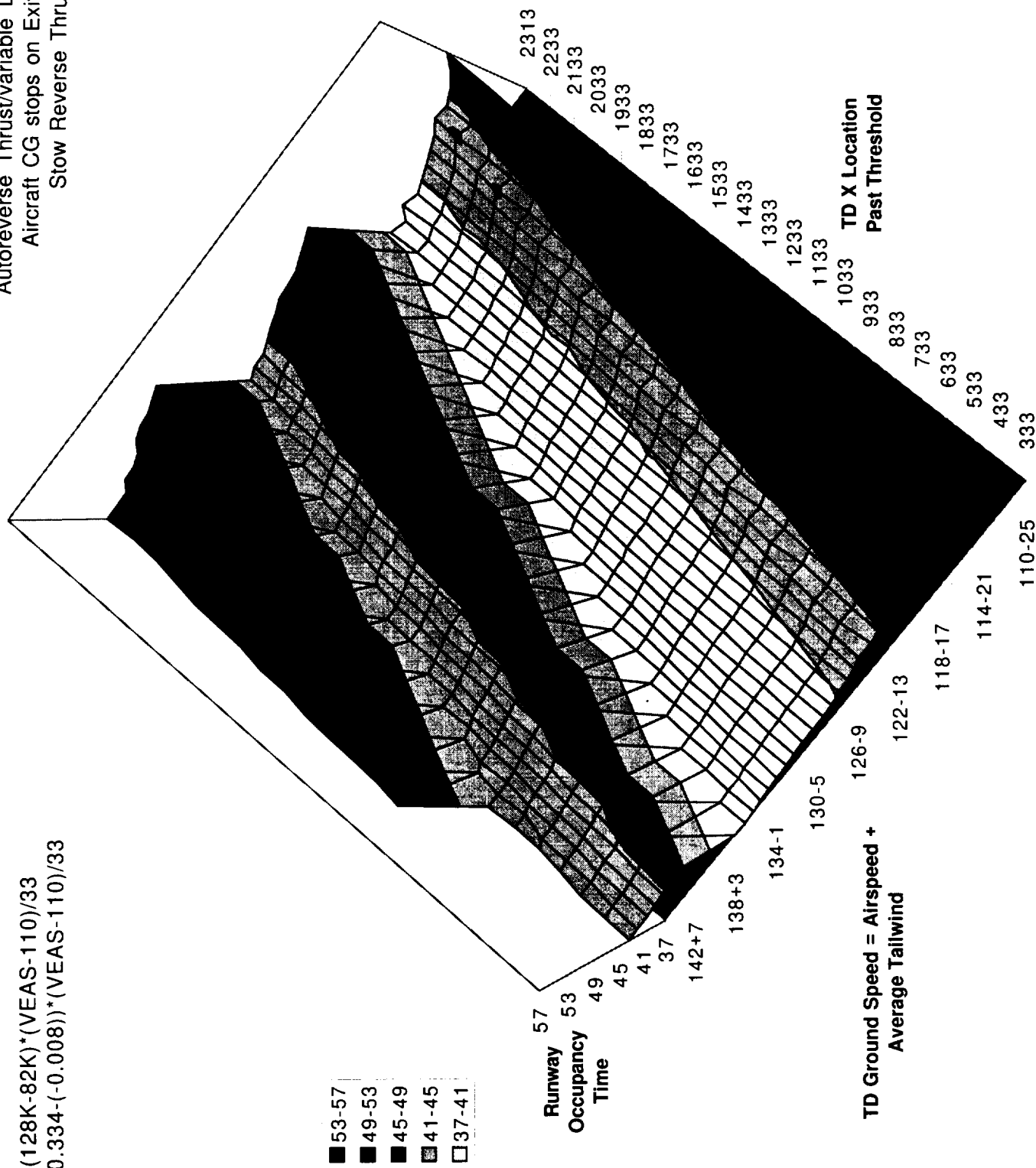
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

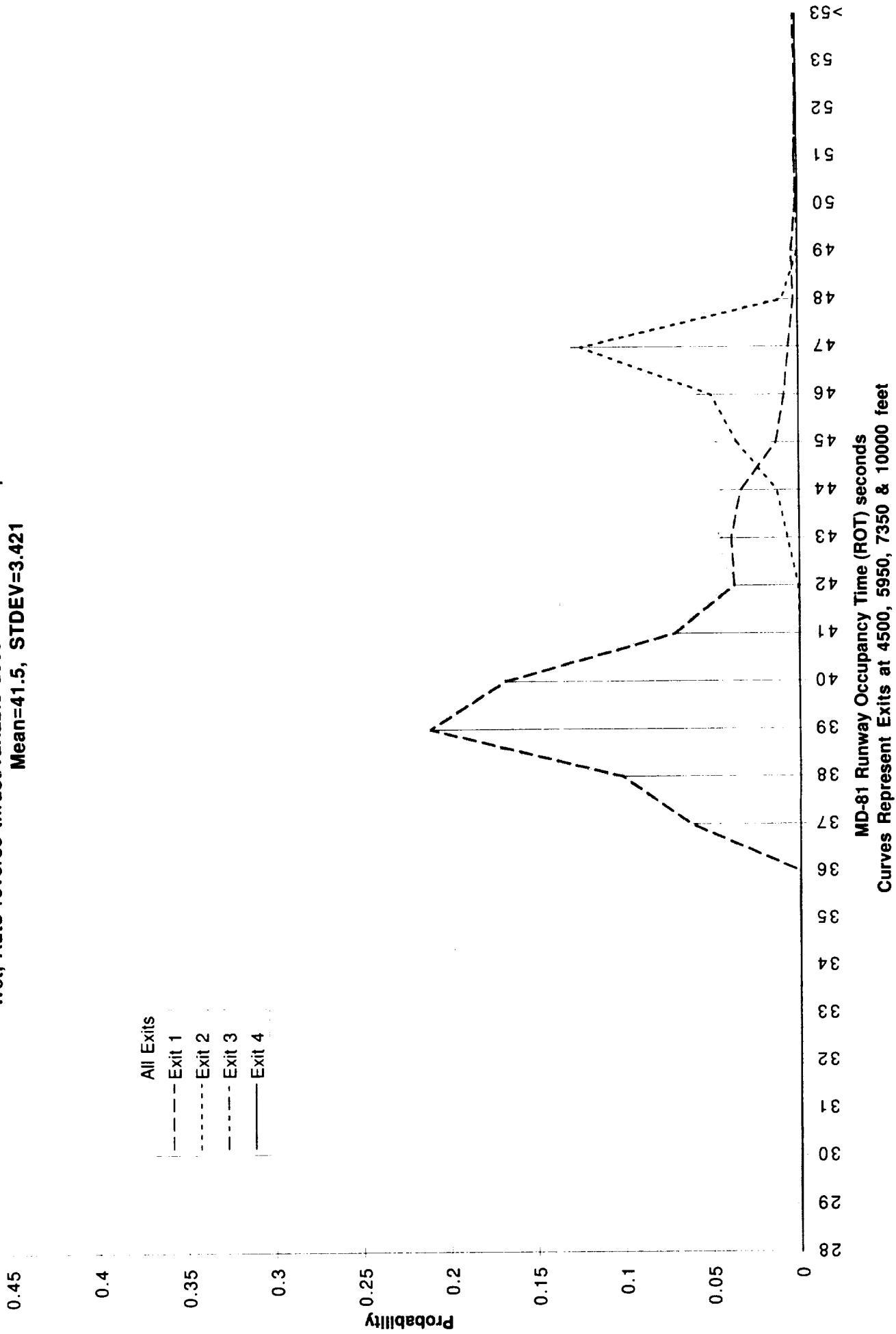
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Aircraft CG stops on Exit at Y=480ft
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Aircraft CG stops on Exit at Y=480ft
Mean=41.5, STDEV=3.421



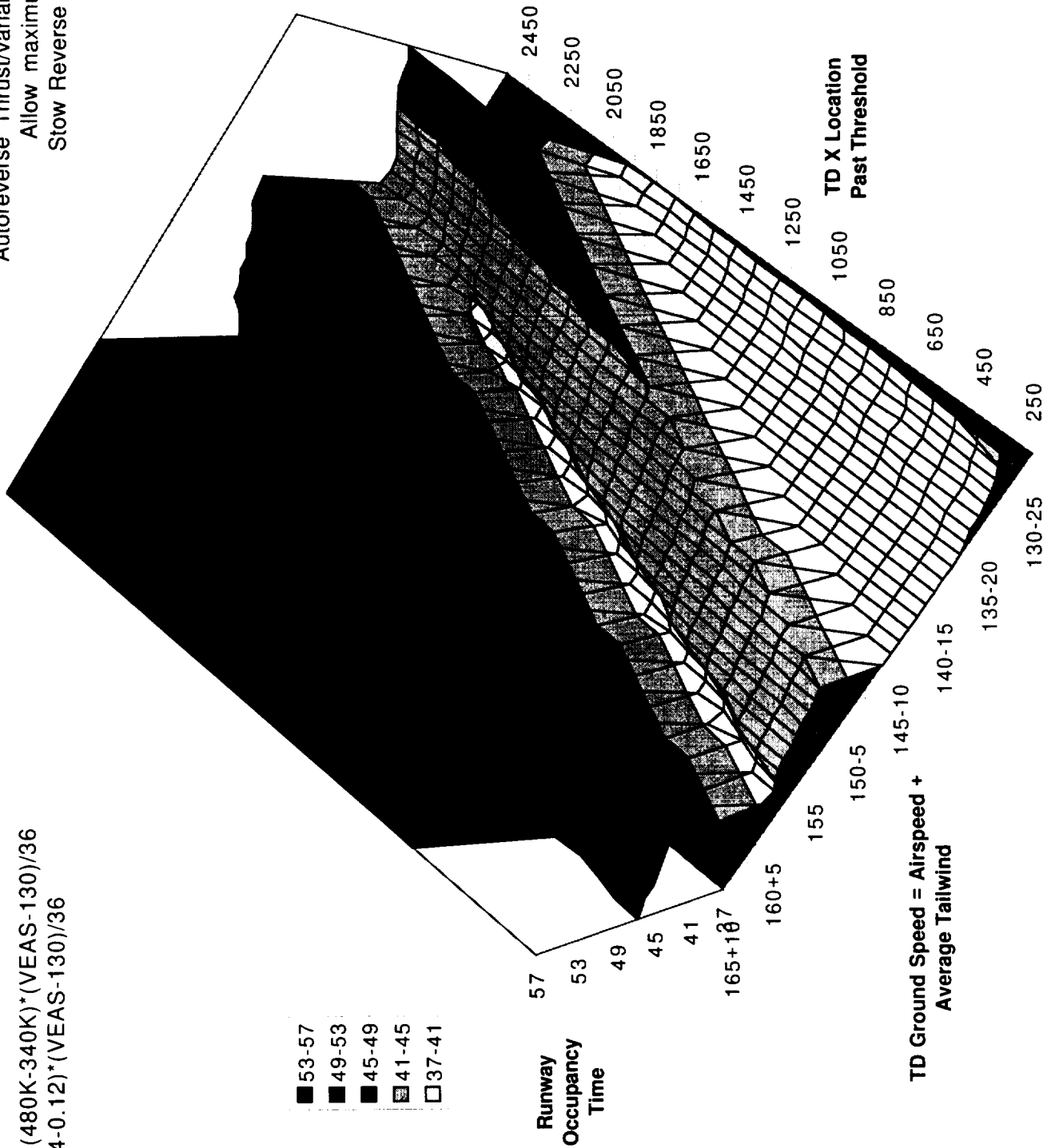
Wet, Exits=3900, 5350, 6950, 10000
 Autoreverse Thrust/variable Deceleration
 Allow maximum 9ft/s decel
 Stow Reverse Thrust=70 kt gd

MD-11 ROTO Occupancy Time

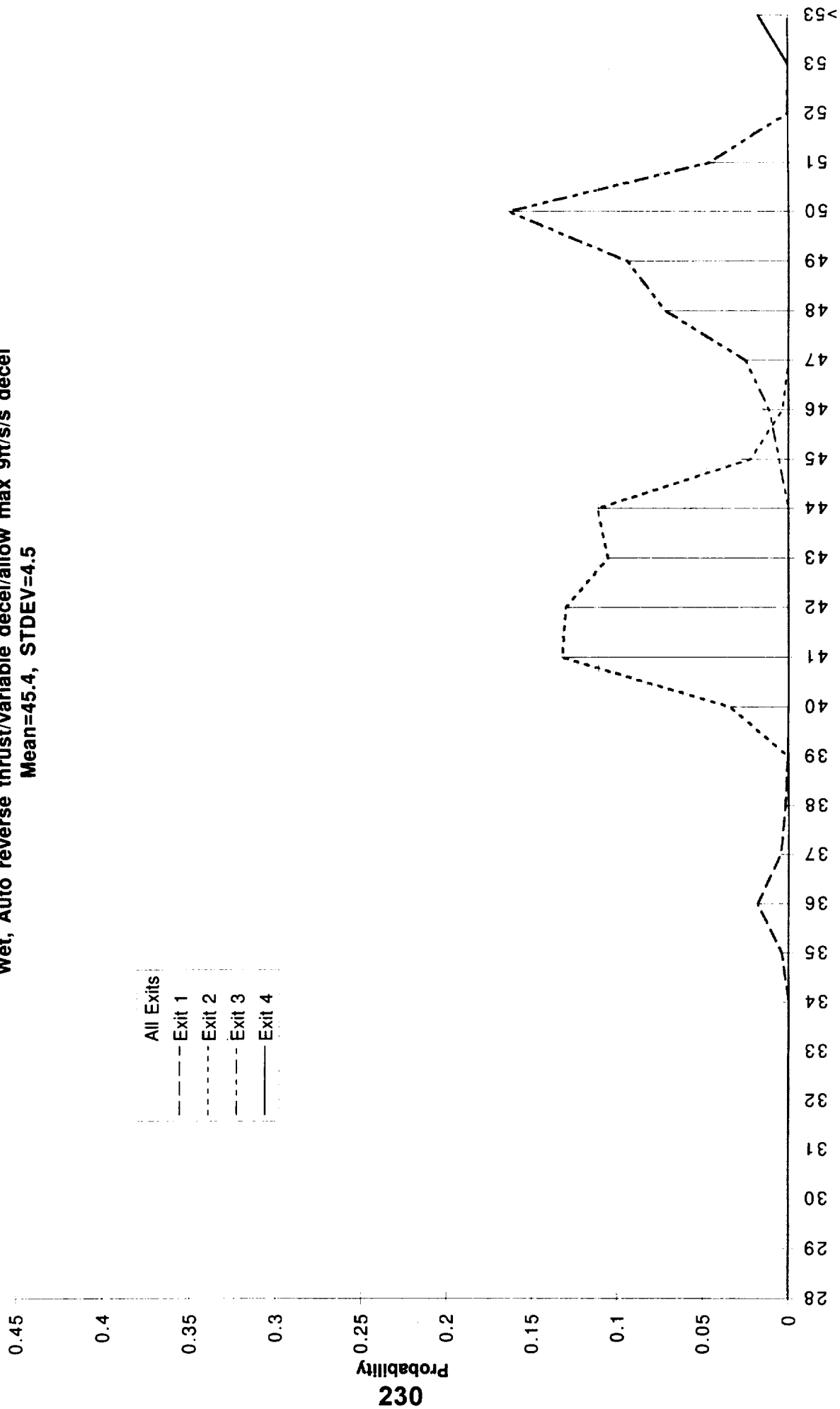
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/allow max 9ft/s/s decel
Mean=45.4, STDEV=4.5



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3900, 5350, 6950 & 10000 feet

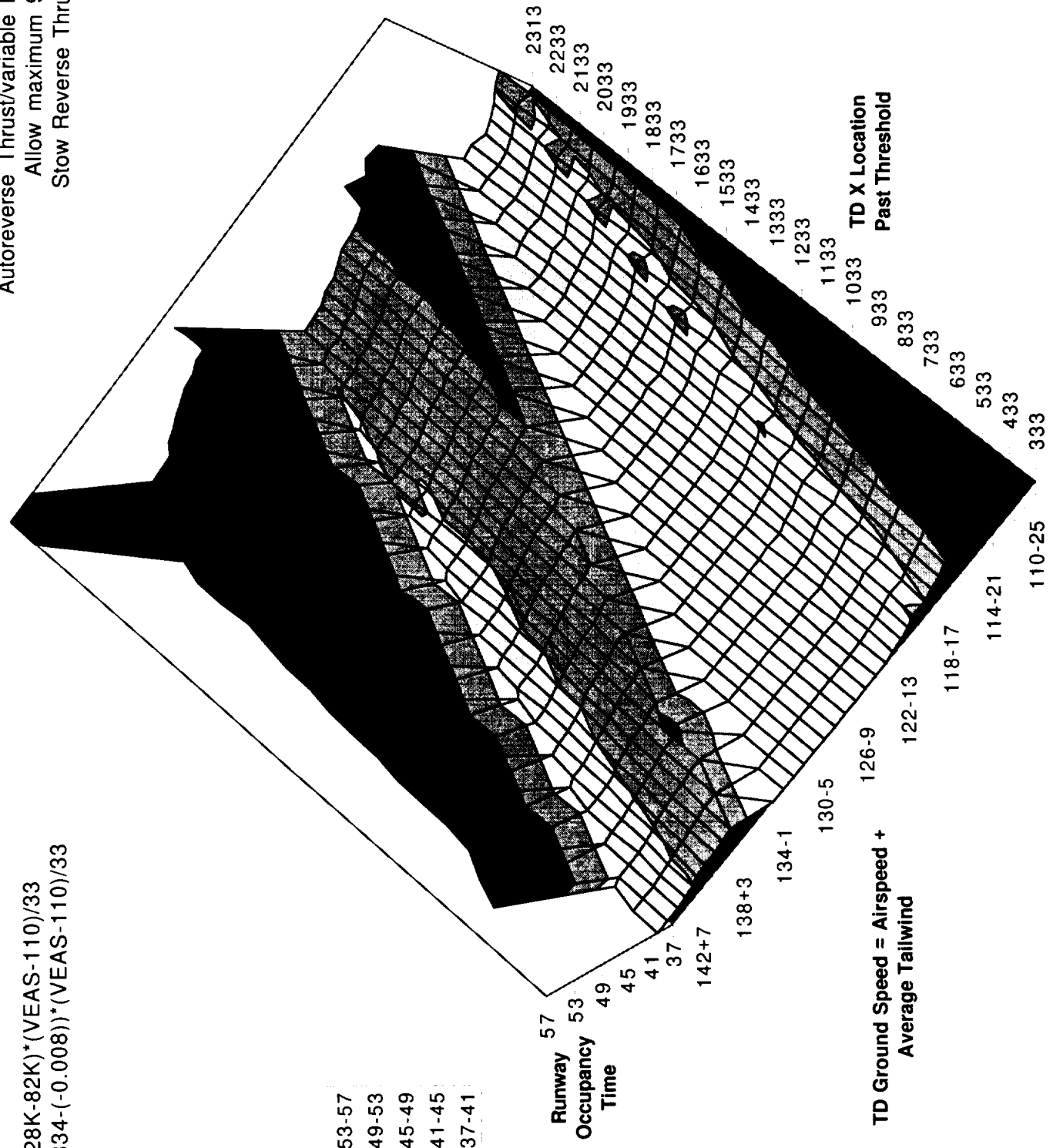
Wet, Exits=3900, 5350, 6950, 10000
 Autoreverse Thrust/variable Deceleration
 Allow maximum 9ft/s/s decel
 Stow Reverse Thrust=70 kt gd

MD-81 ROTO Occupancy Time

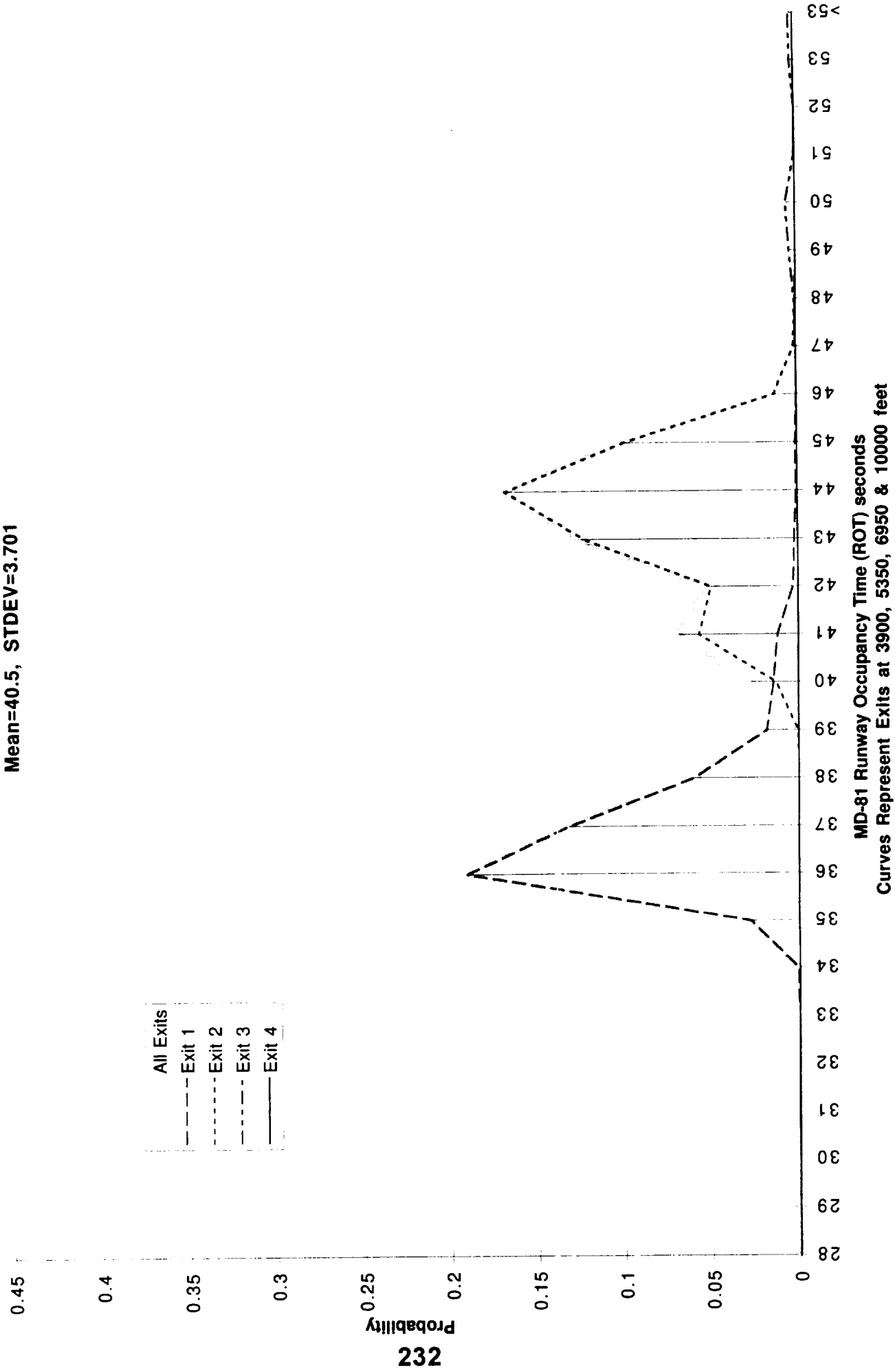
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/allow max 9ft/s/s decel
Mean=40.5, STDEV=3.701



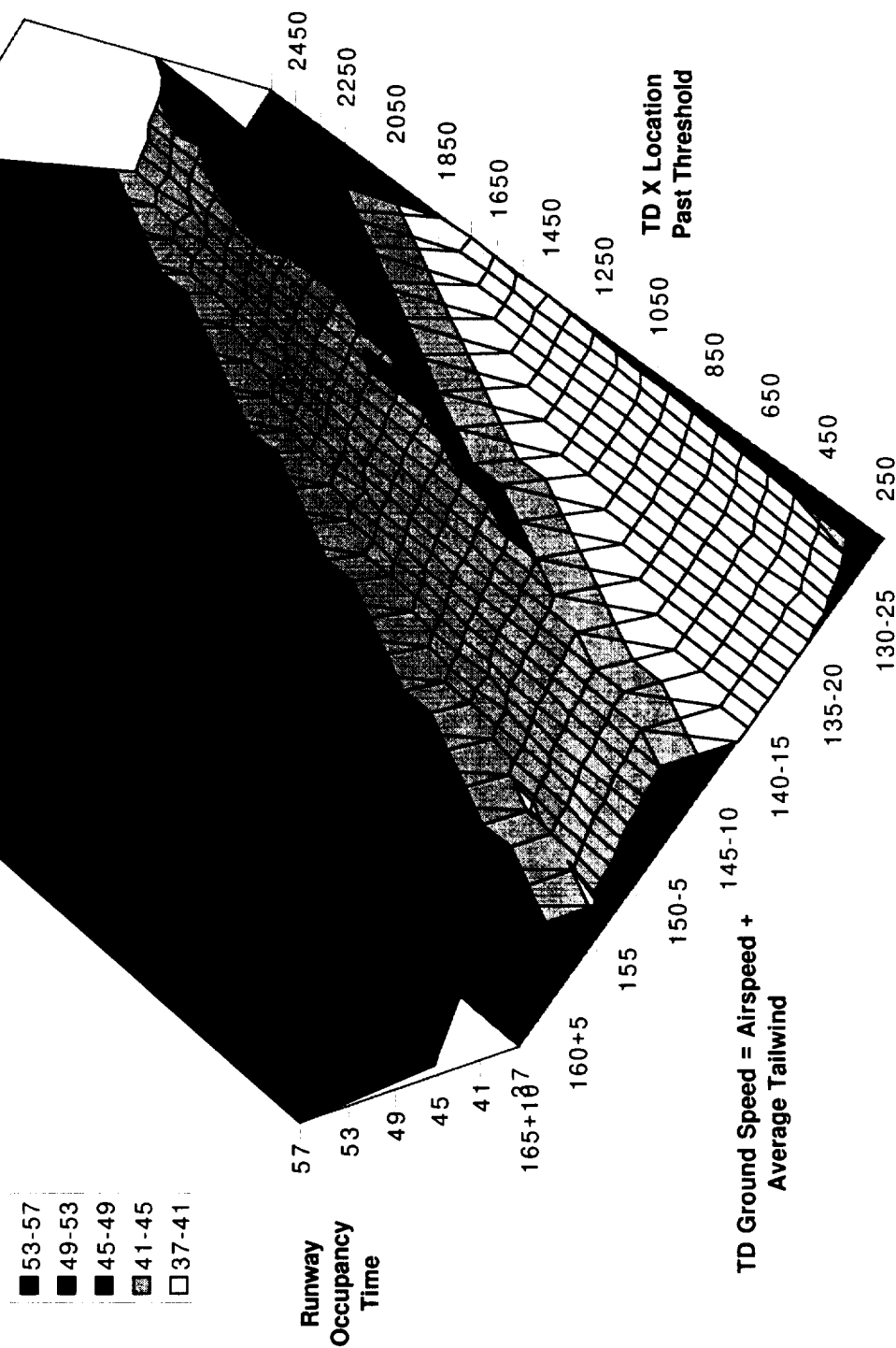
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

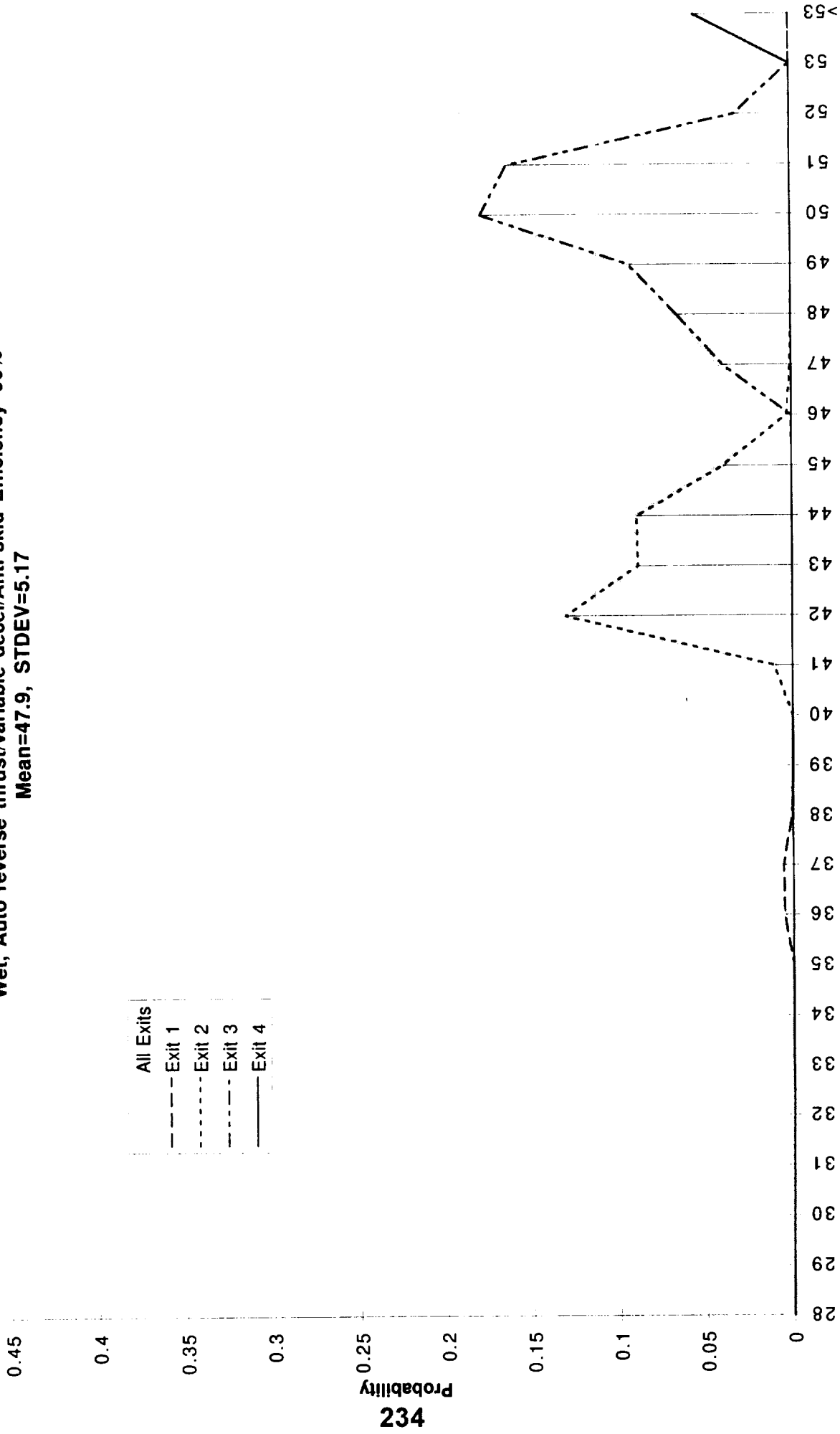
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
Autoreverse Thrust/variable Deceleration
Anti-skid Efficiency=90%
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Anti-skid Efficiency=90%
Mean=47.9, STDEV=5.17



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3900, 5350, 6950 & 10000 feet

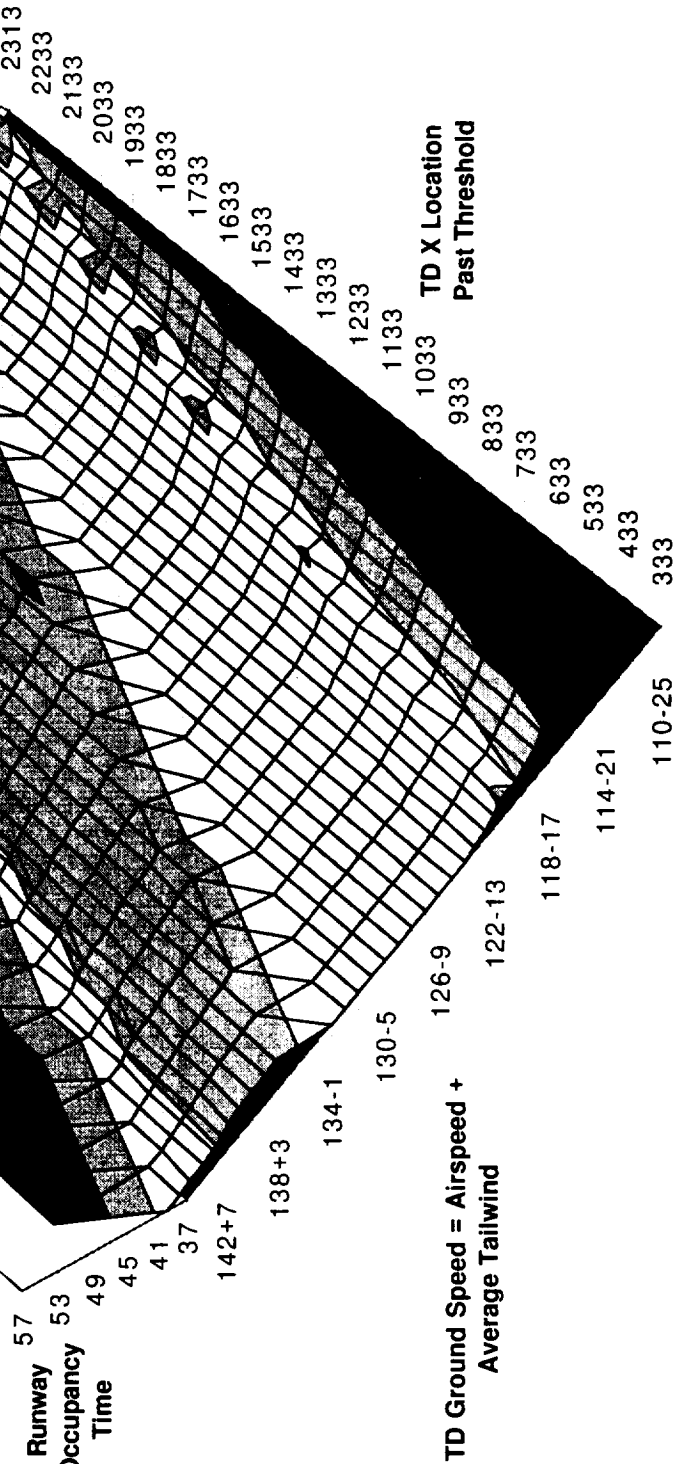
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

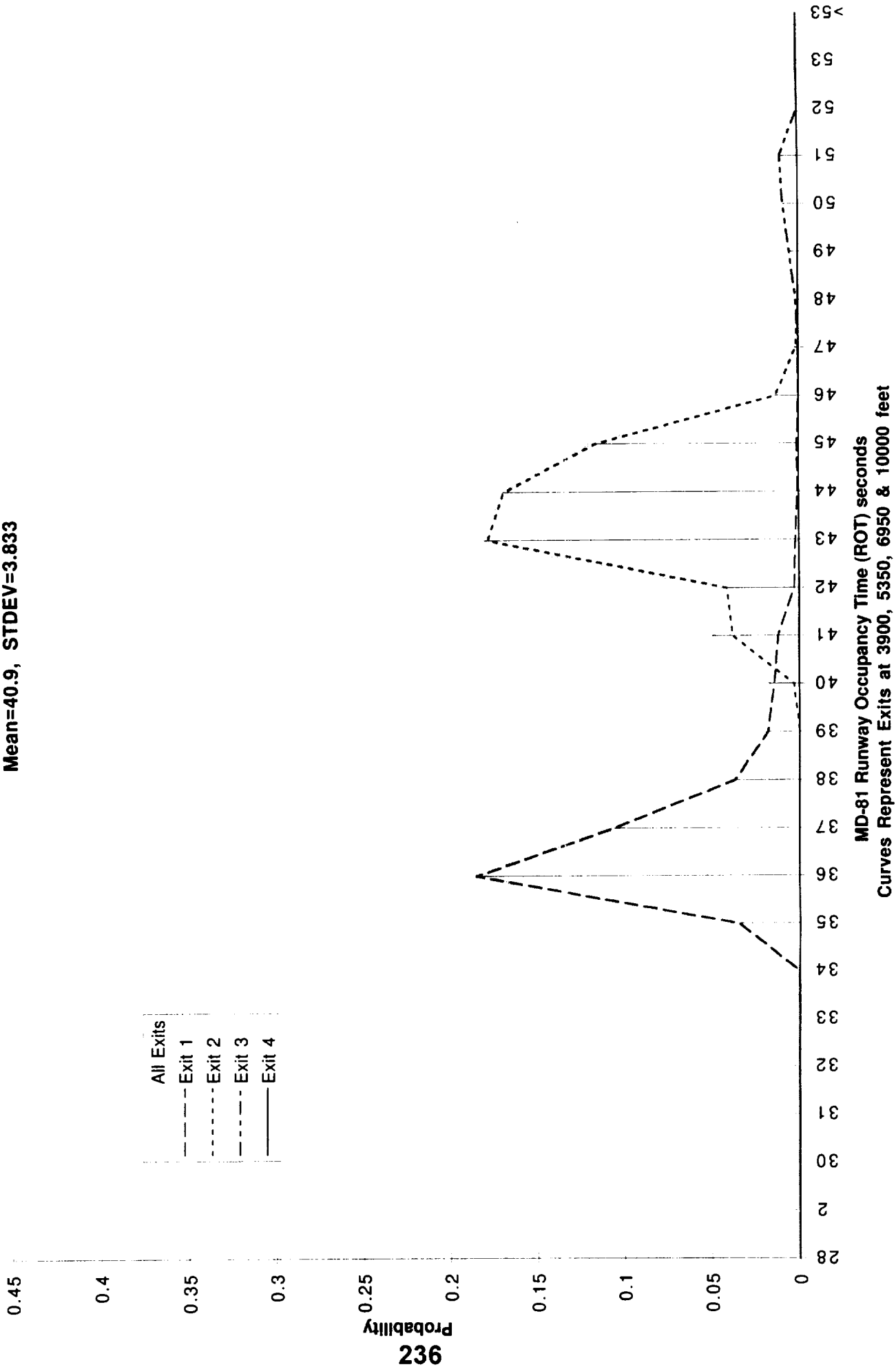
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
Autoreverse Thrust/variable Deceleration
Anti-skid Efficiency=90%
Stow Reverse Thrust=70 kt/gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Anti-skid Efficiency=90%
Mean=40.9, STDEV=3.833



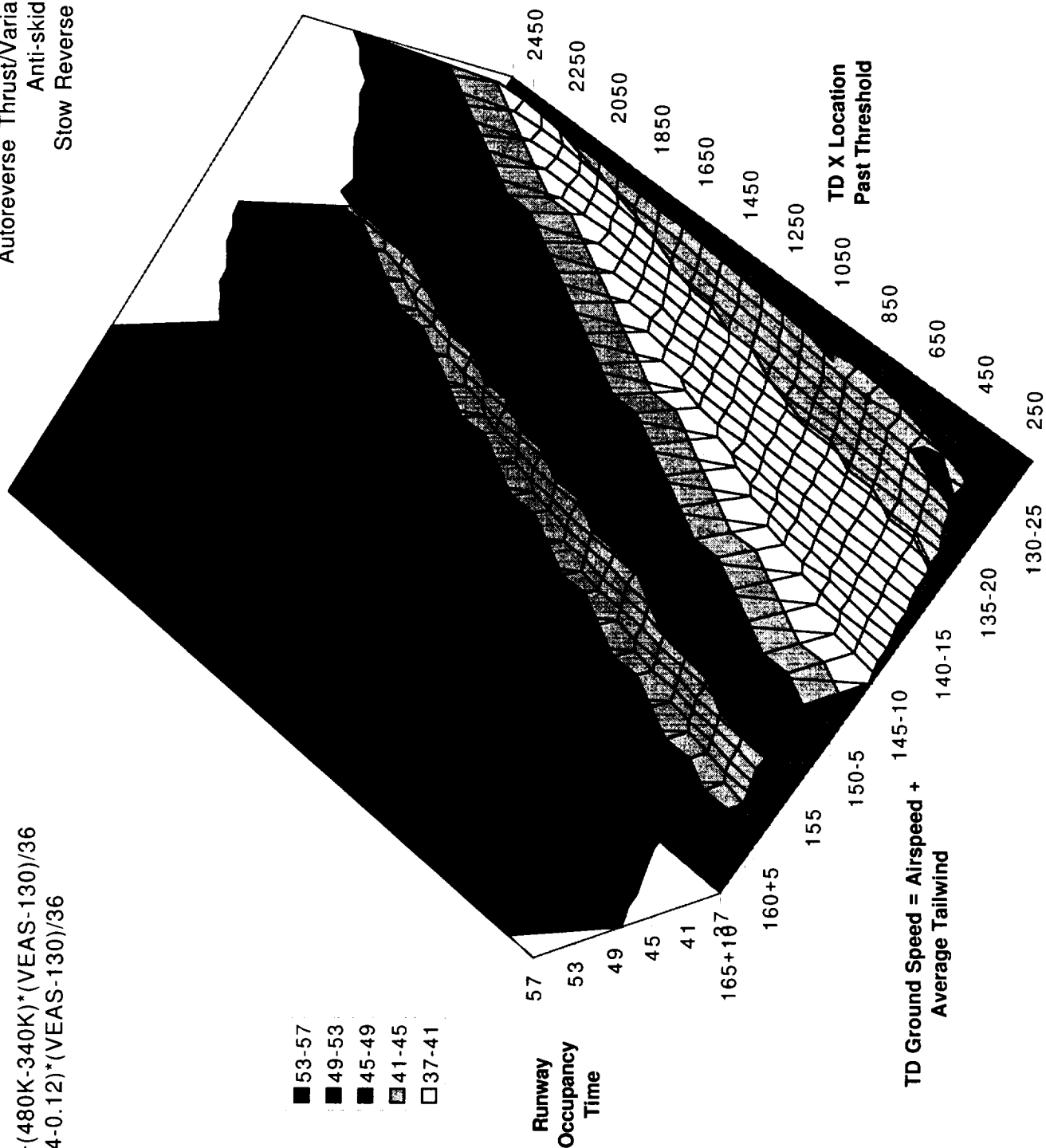
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

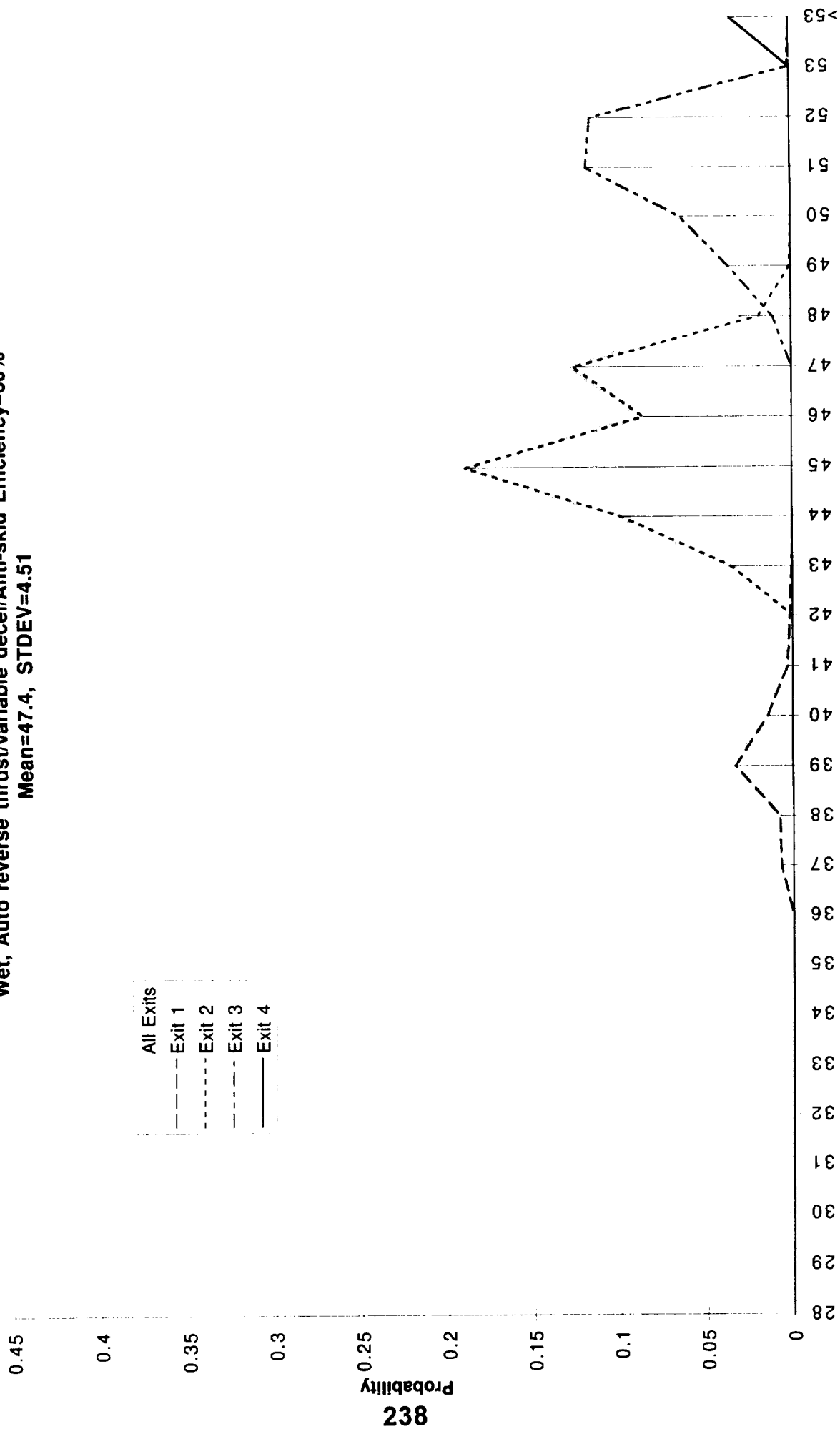
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Anti-skid Efficiency=60%
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Anti-skid Efficiency=60%
Mean=47.4, STDEV=4.51



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

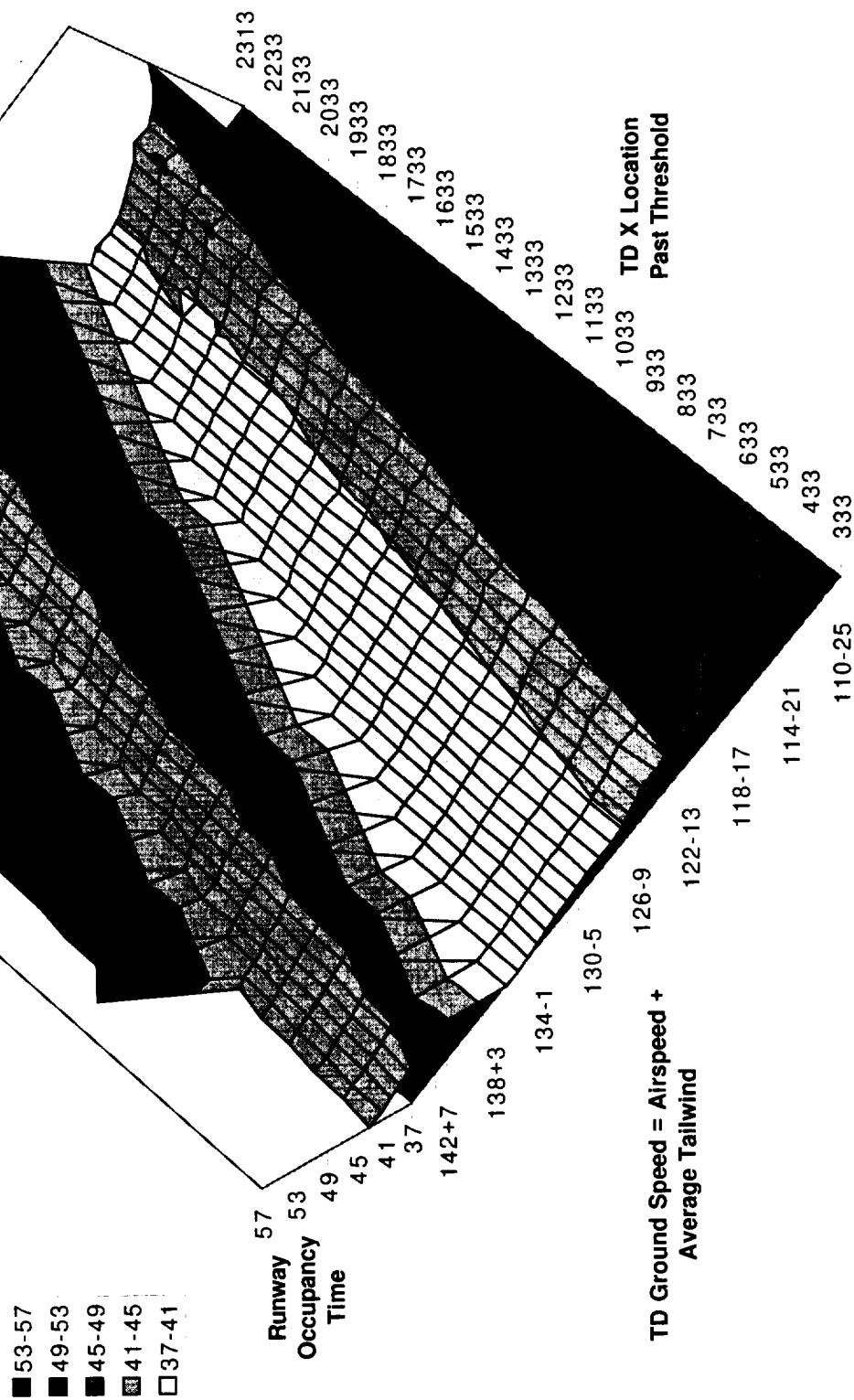
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

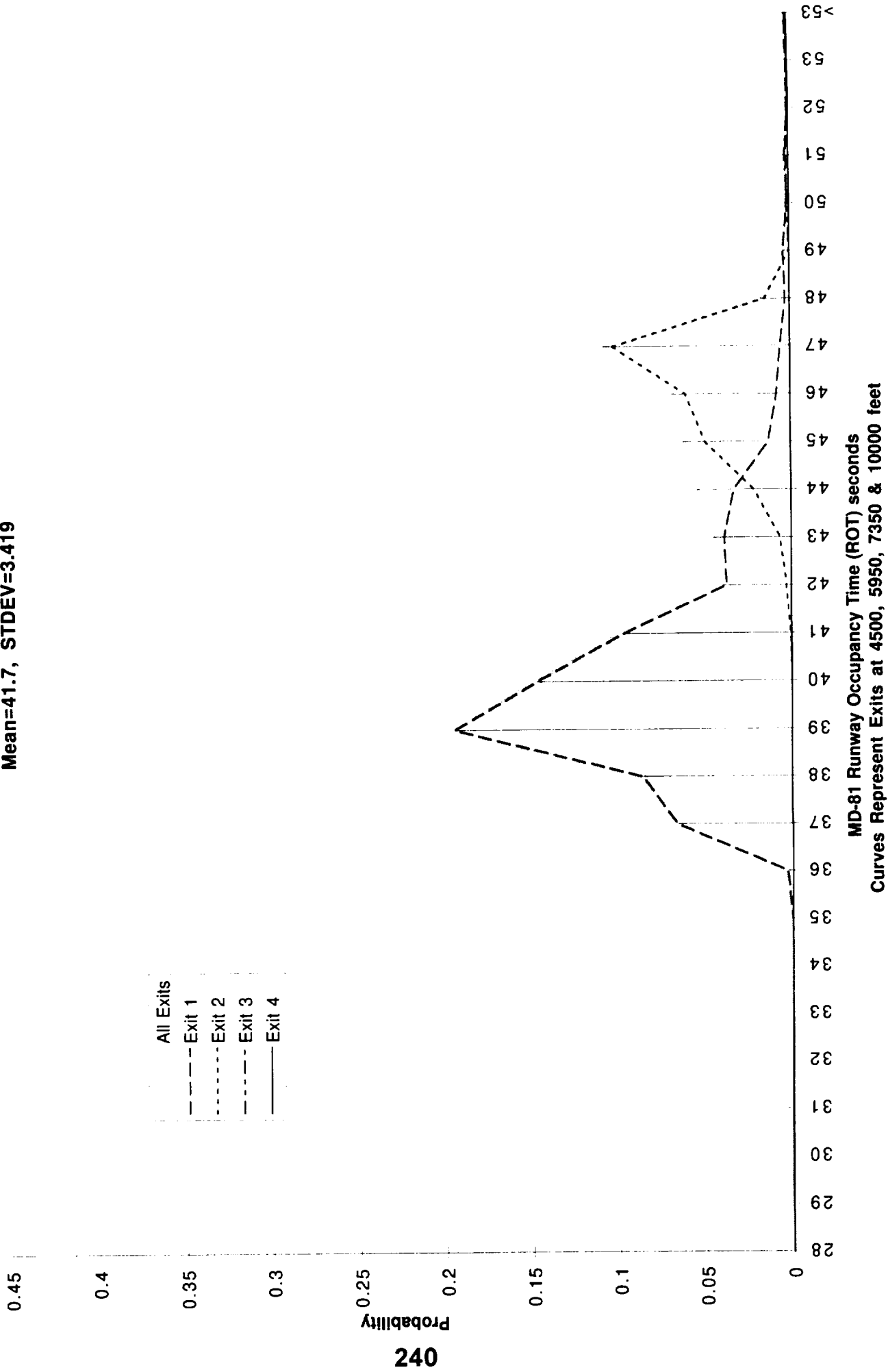
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Anti-skid Efficiency=60%
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Anti-skid Efficiency=60%
Mean=41.7, STDEV=3.419



Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

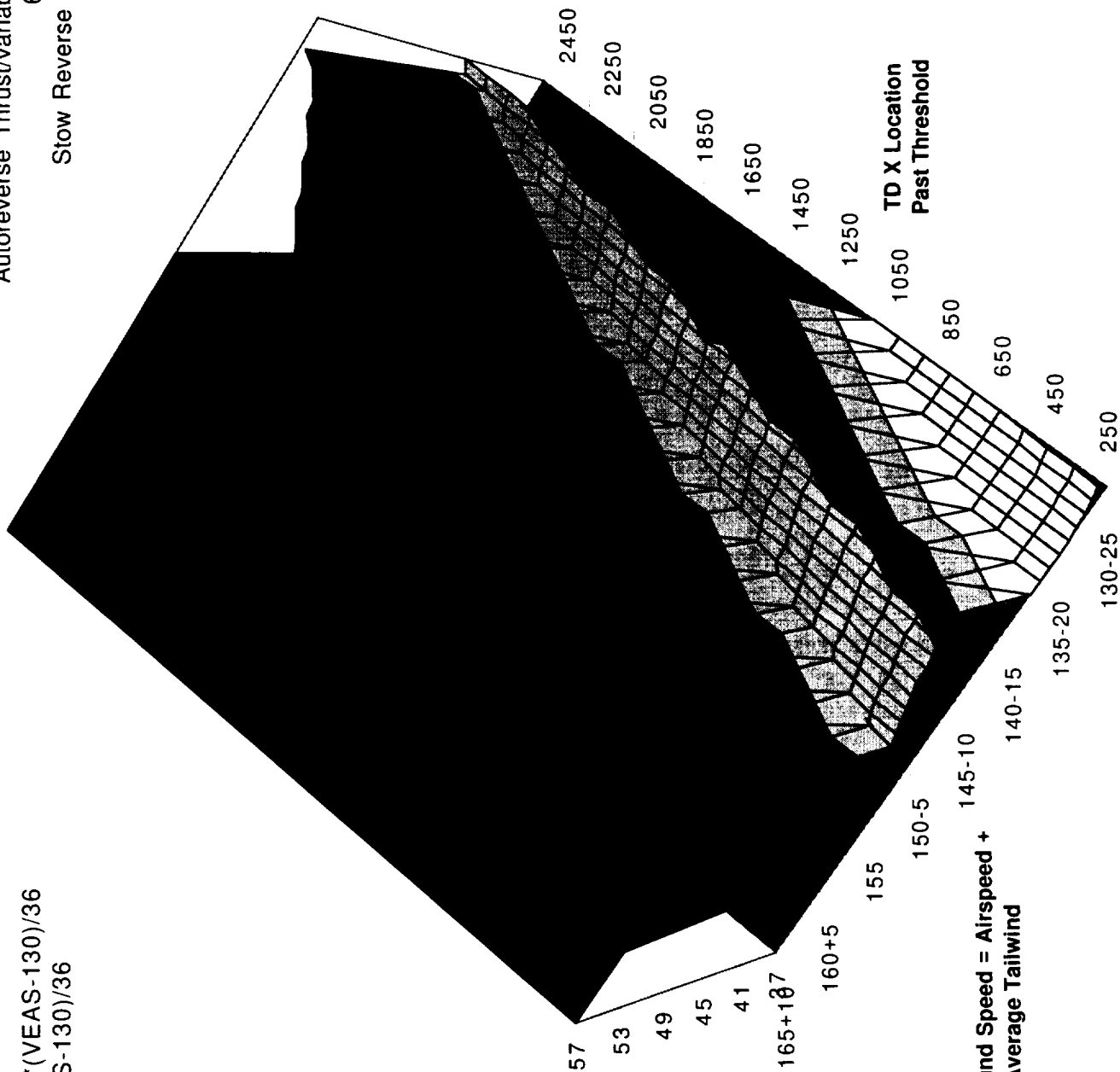
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Autoreverse Thrust/variable Deceleration
60 kt exit speed
Stow Reverse Thrust=60 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

Runway
Occupancy
Time

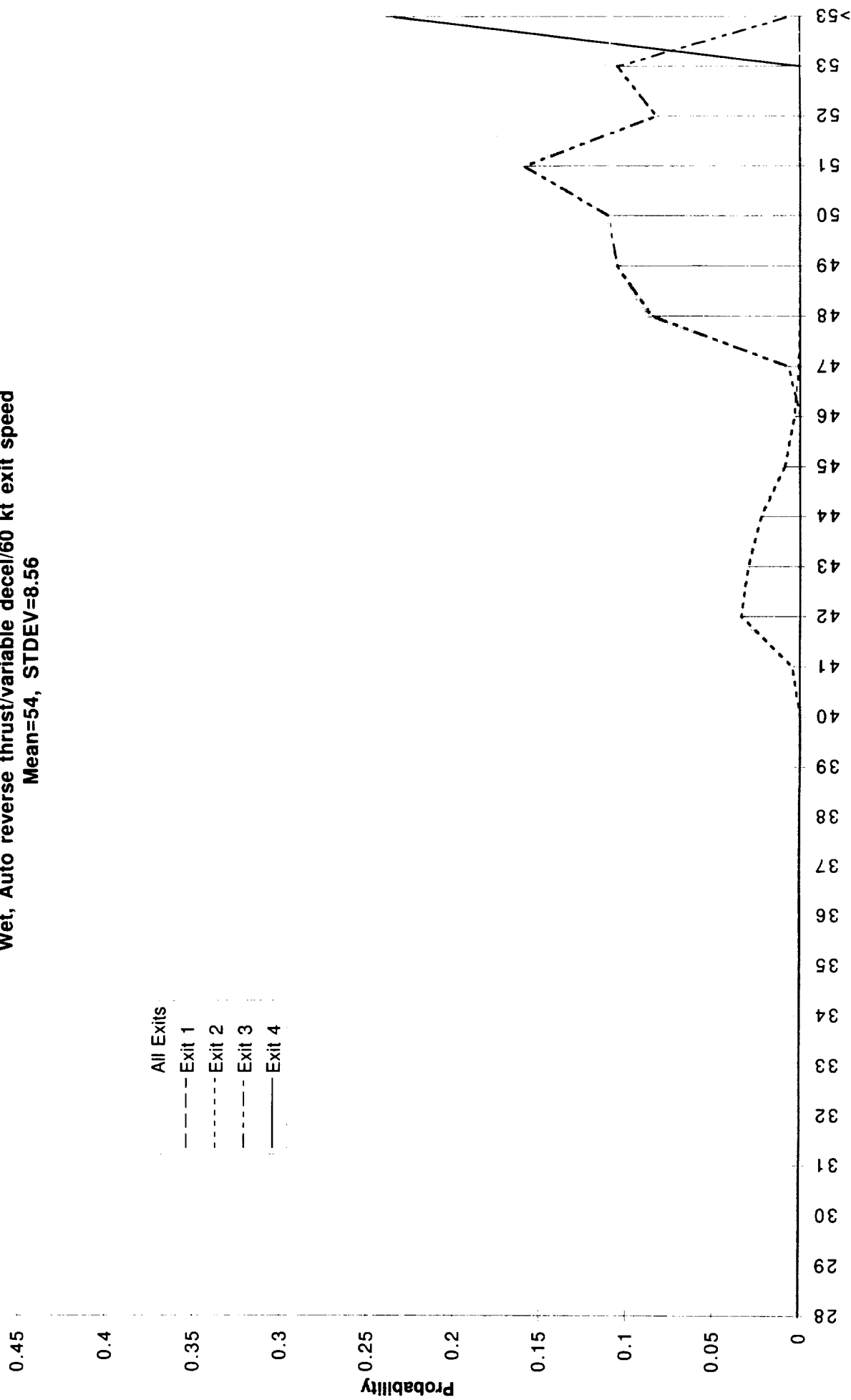


TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/60 kt exit speed
Mean=54, STDEV=8.56

- All Exits
- Exit 1
 - Exit 2
 - Exit 3
 - Exit 4



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3500, 4950, 6550 & 10000 feet

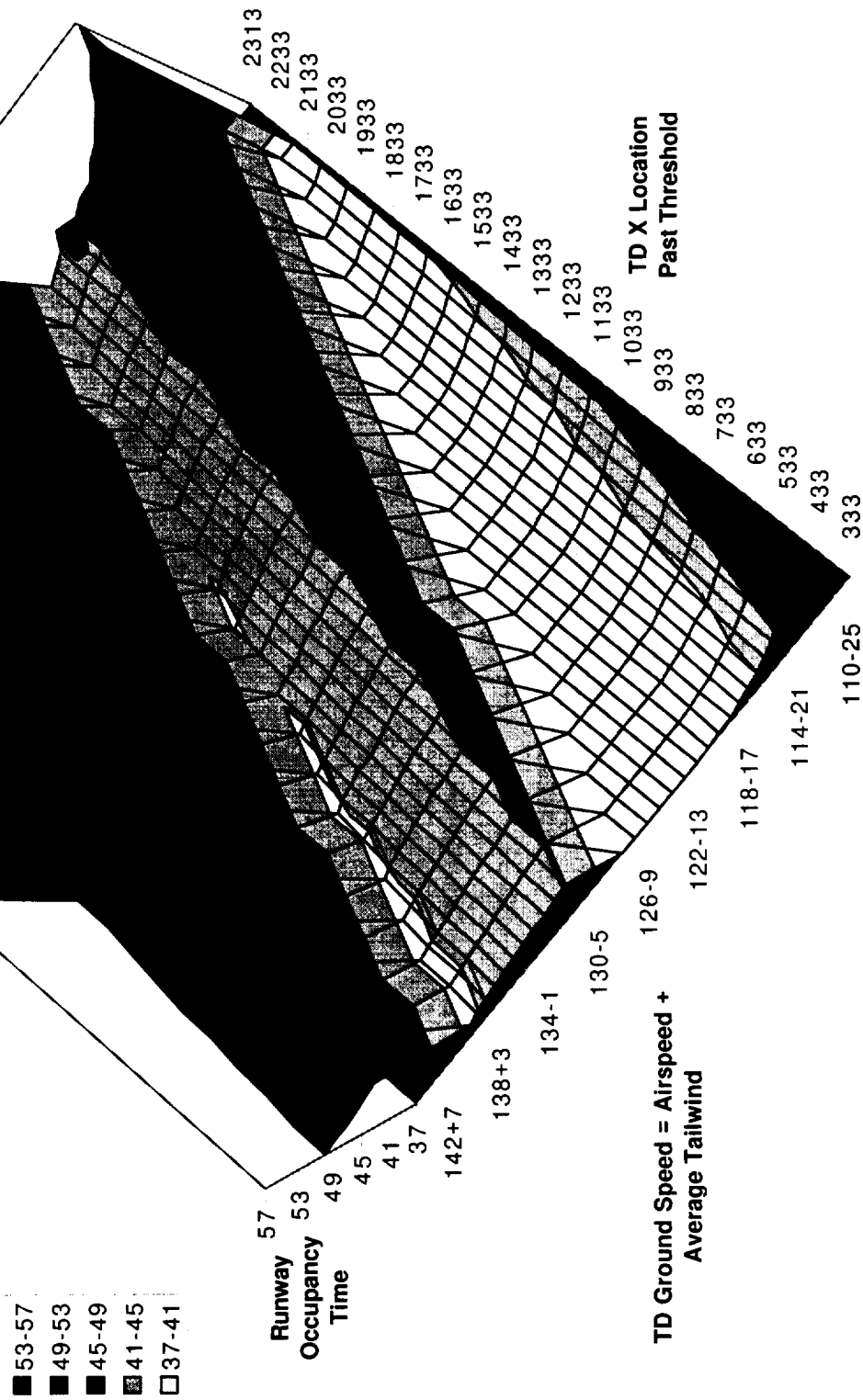
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

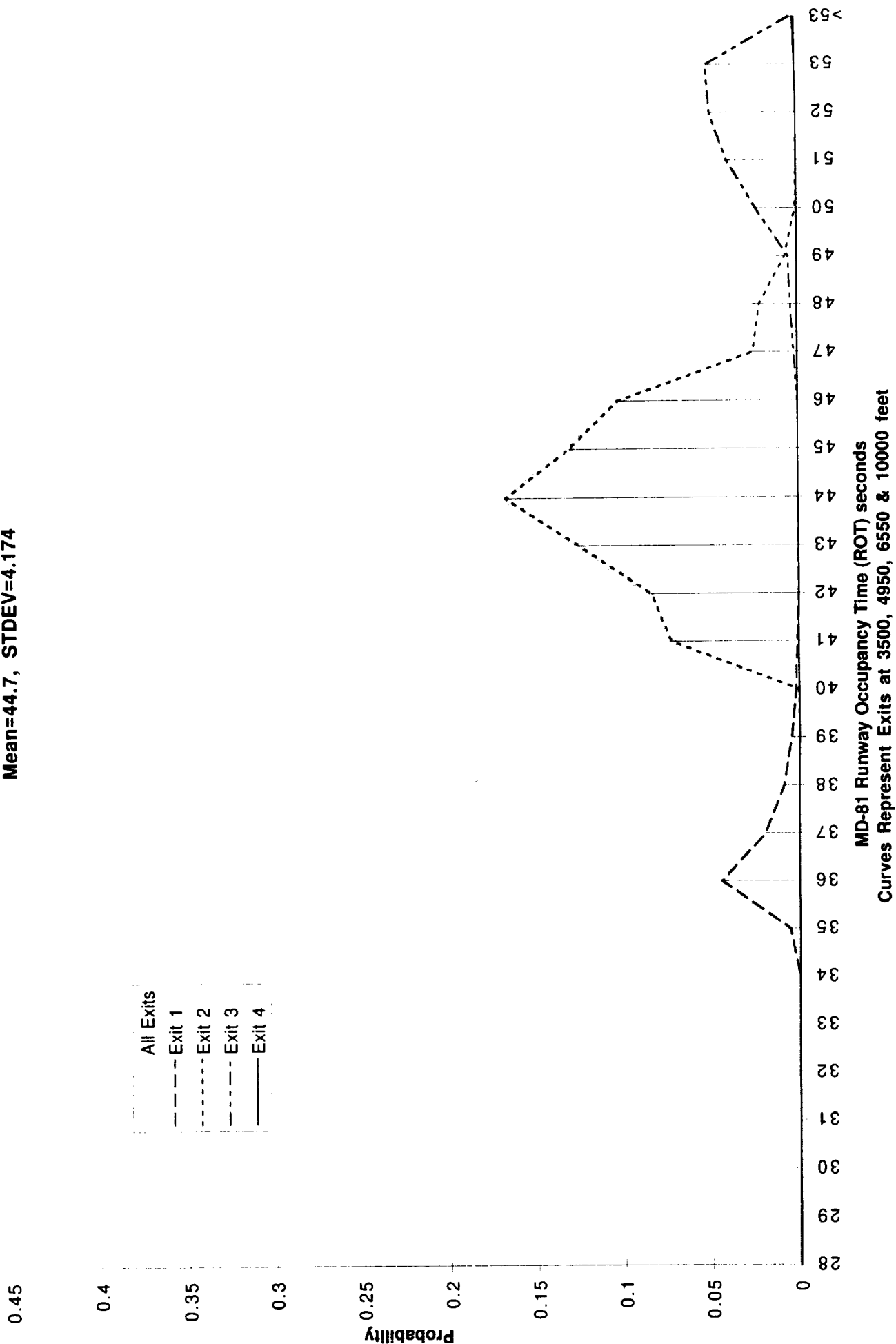
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
Autoreverse Thrust/variable Deceleration
60 kt exit speed
Stow Reverse Thrust=60 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/60 kt exit speed
Mean=44.7, STDEV=4.174



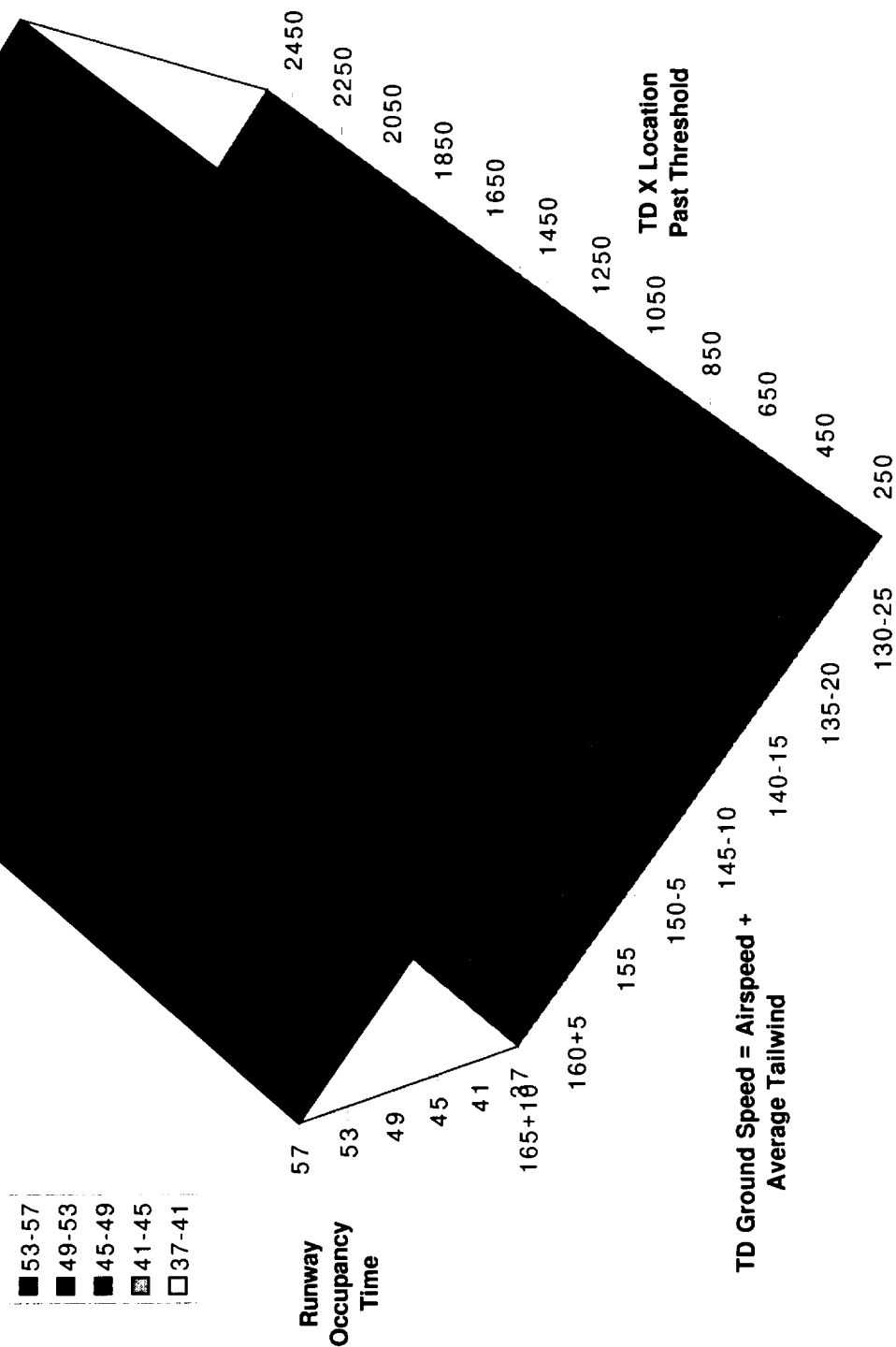
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

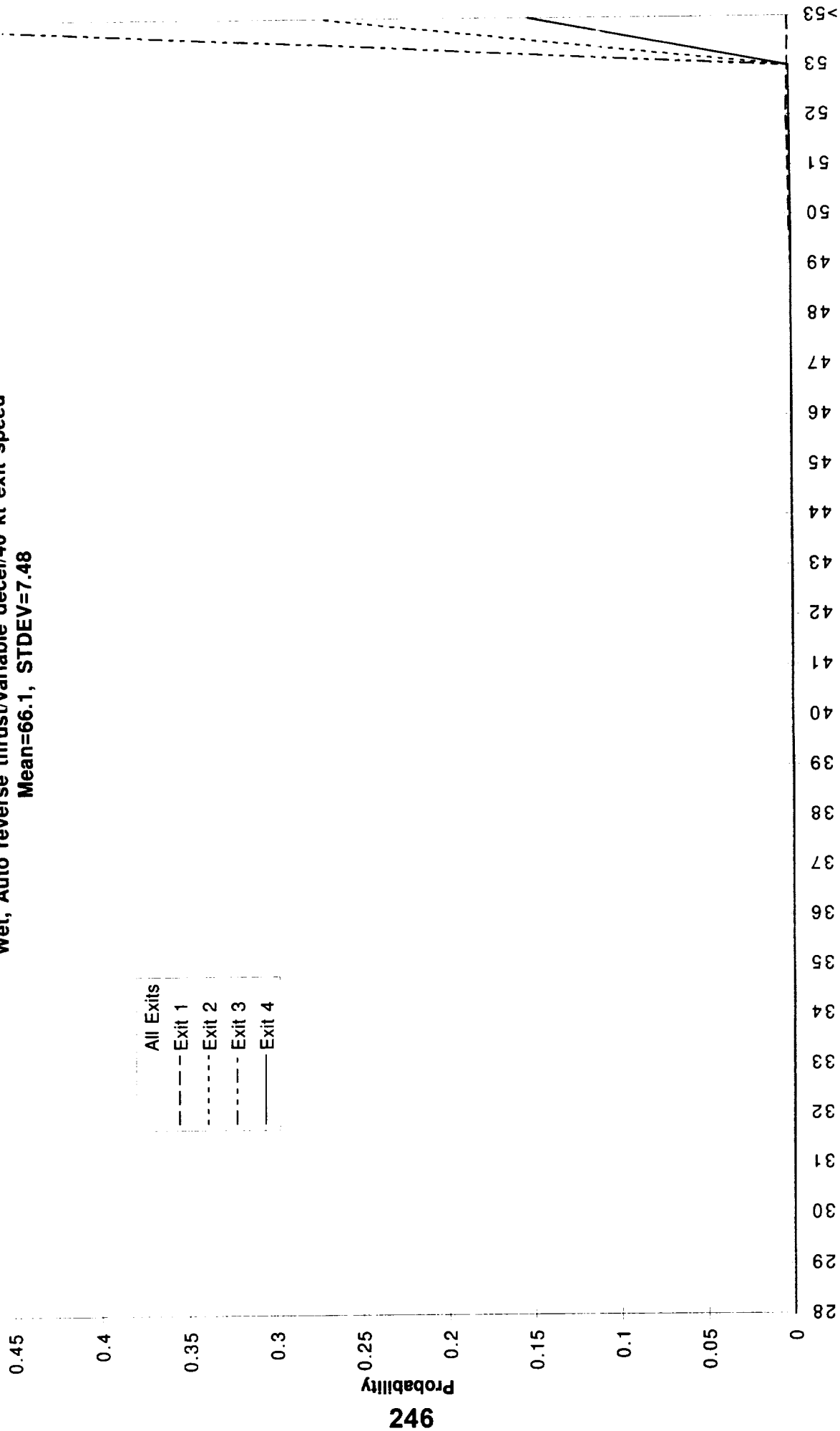
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Stow Reverse Thrust=40 kt gd
40 knot high speed exit



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/40 kt exit speed
Mean=66.1, STDEV=7.48



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

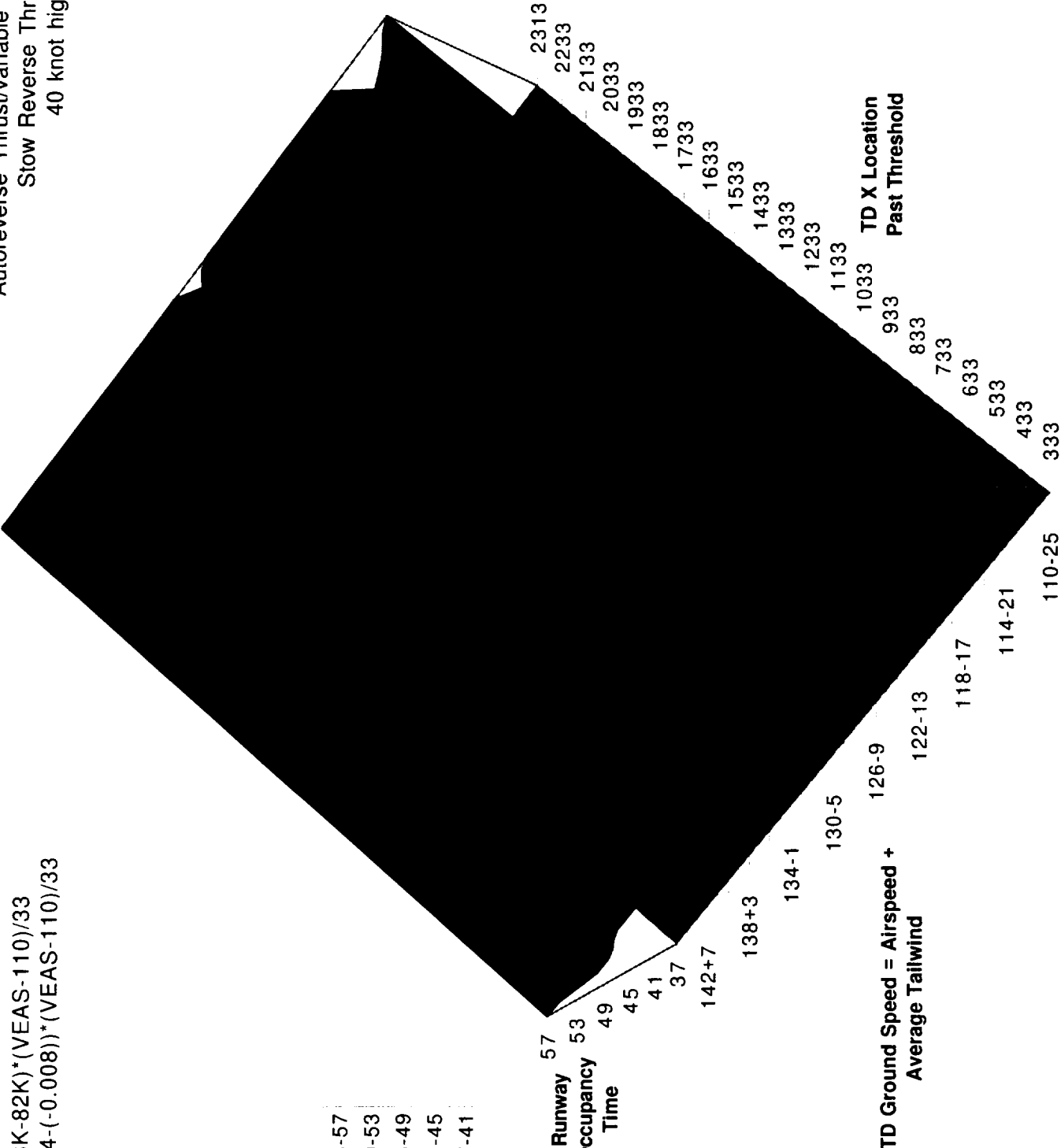
Predict exit prior to TD

$Weight = 82K + (128K - 82K) * (VEAS - 110) / 33$
 $CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$

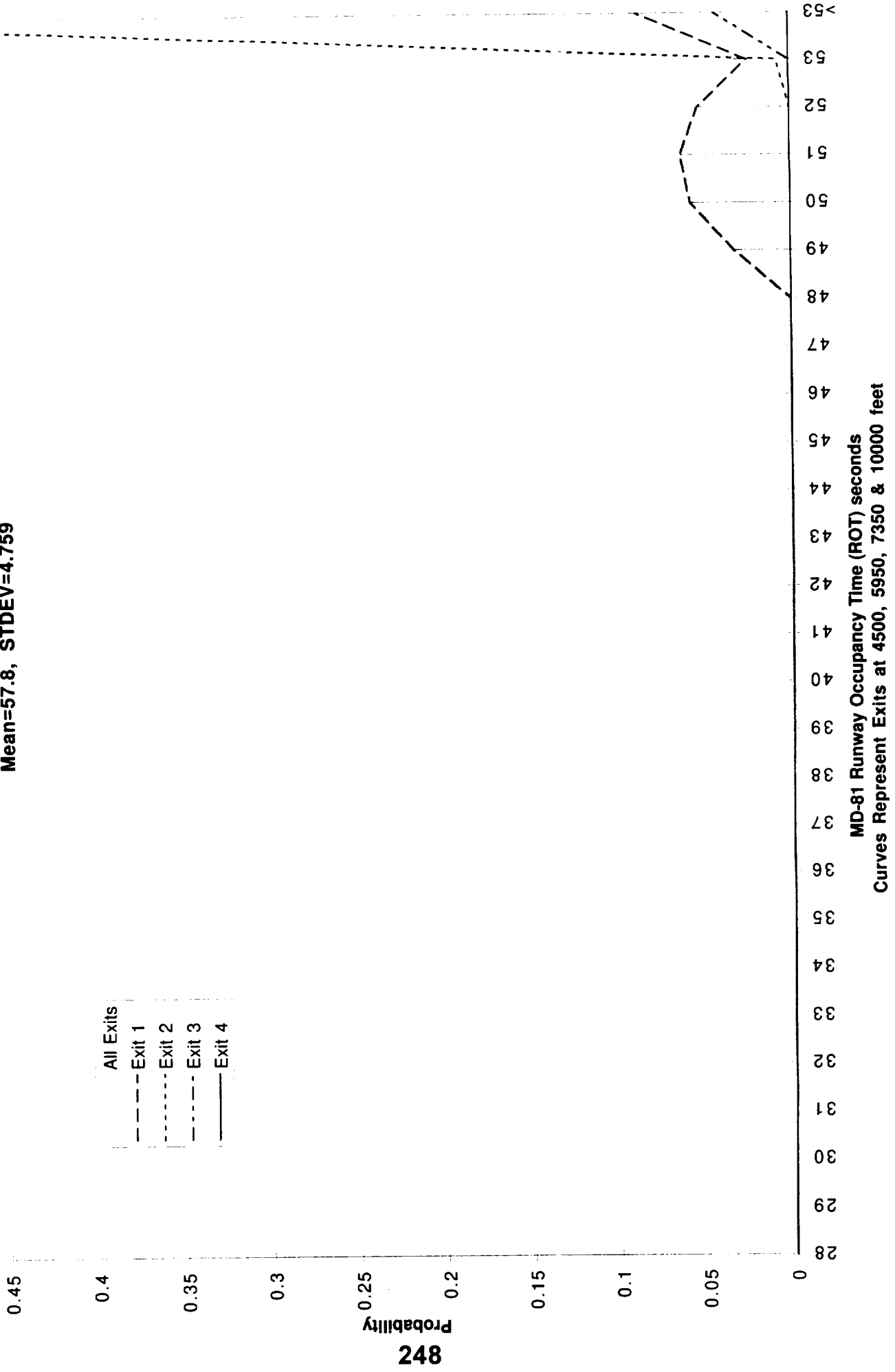
MD-81 ROTO Occupancy Time

Wet, Exits = 4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Stow Reverse Thrust = 40 kt gd
40 knot high speed exit

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/40 kt exit speed
Mean=57.8, STDEV=4.759



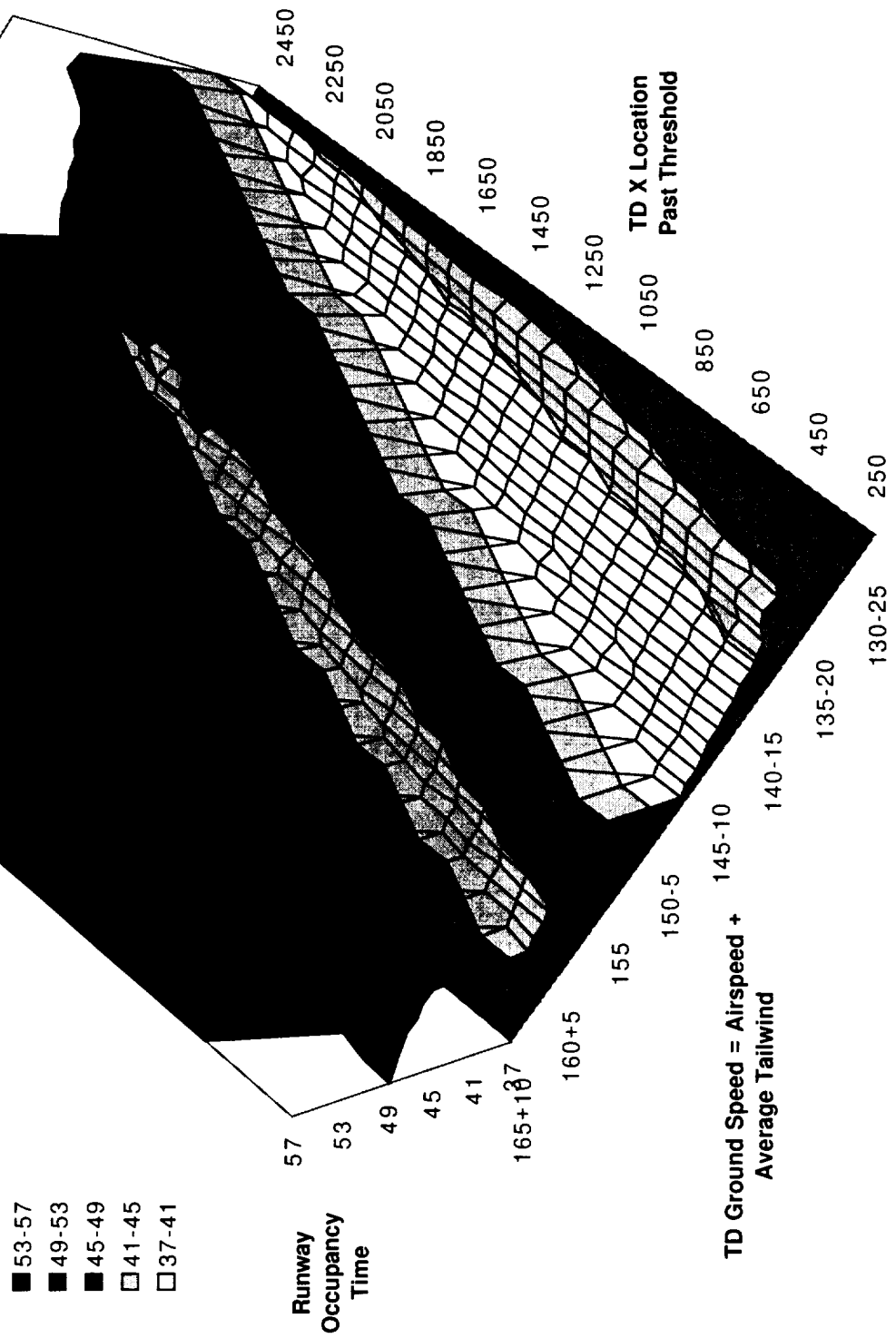
Predict exit prior to TD

MD-11 ROTO Occupancy Time

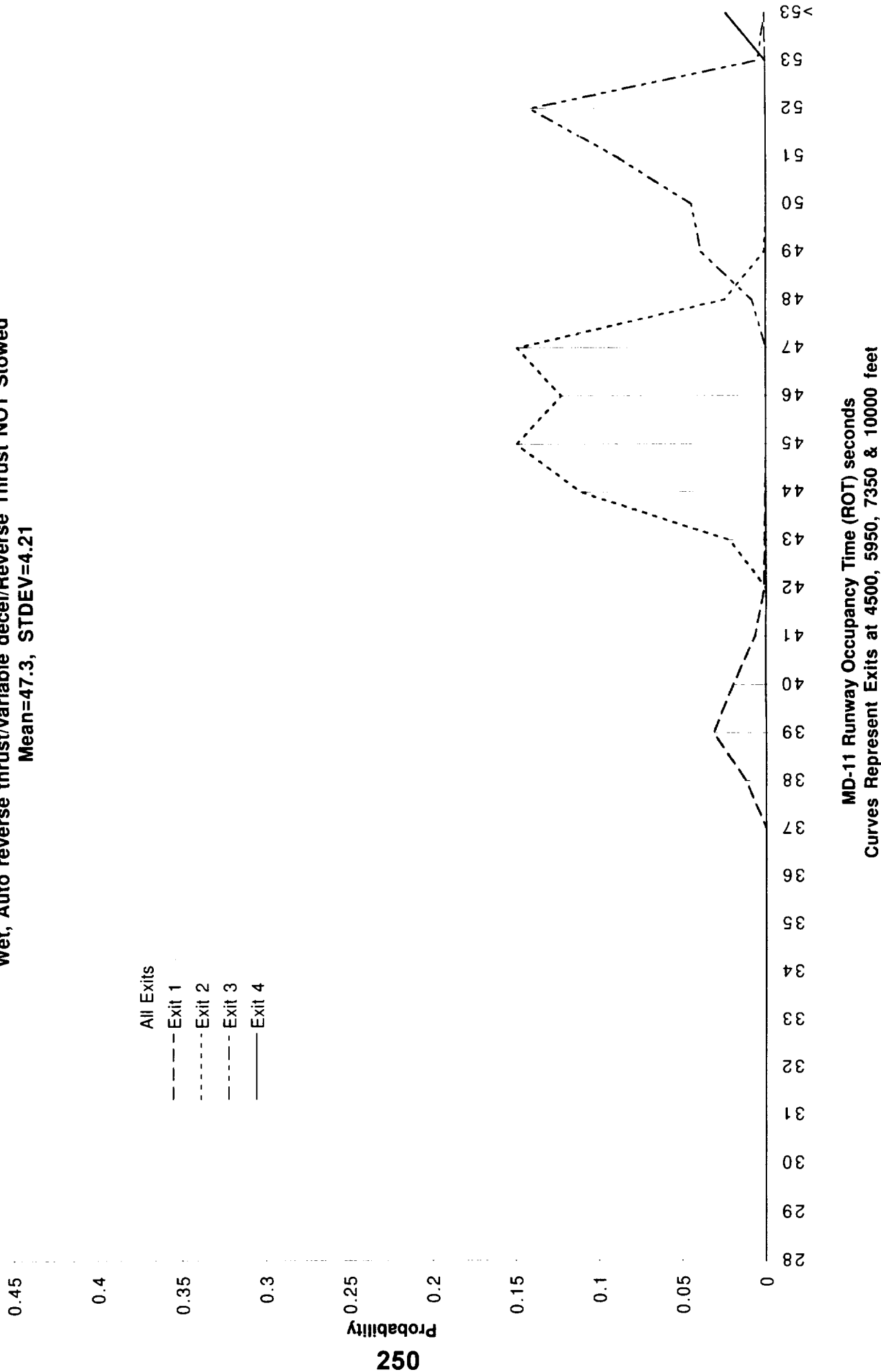
Wet, Exits=4500,5950,7350,10000
Autoreverse Thrust/Variable Deceleration
Reverse Thrust NOT Stowed

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Reverse Thrust NOT Stowed
Mean=47.3, STDEV=4.21



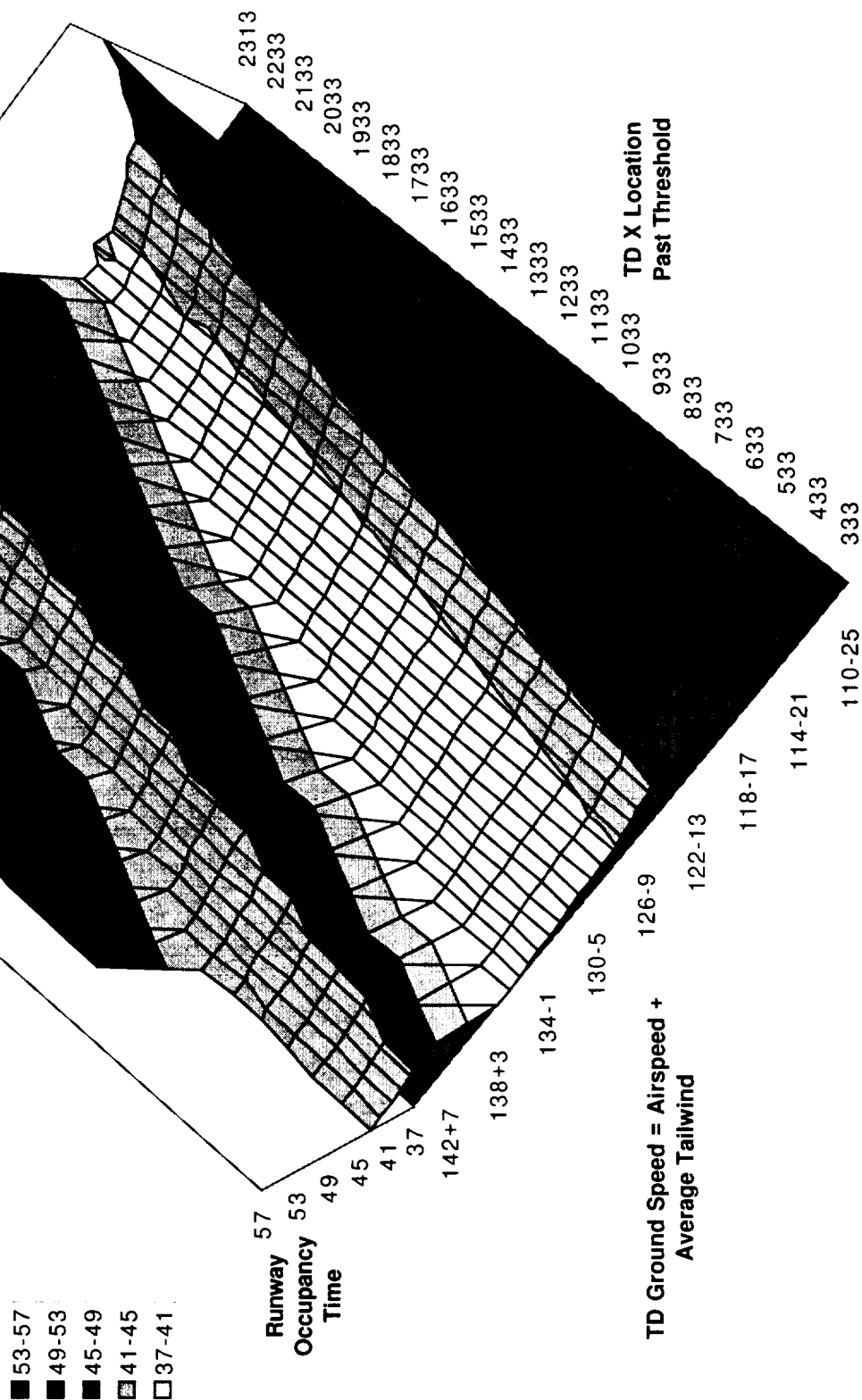
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

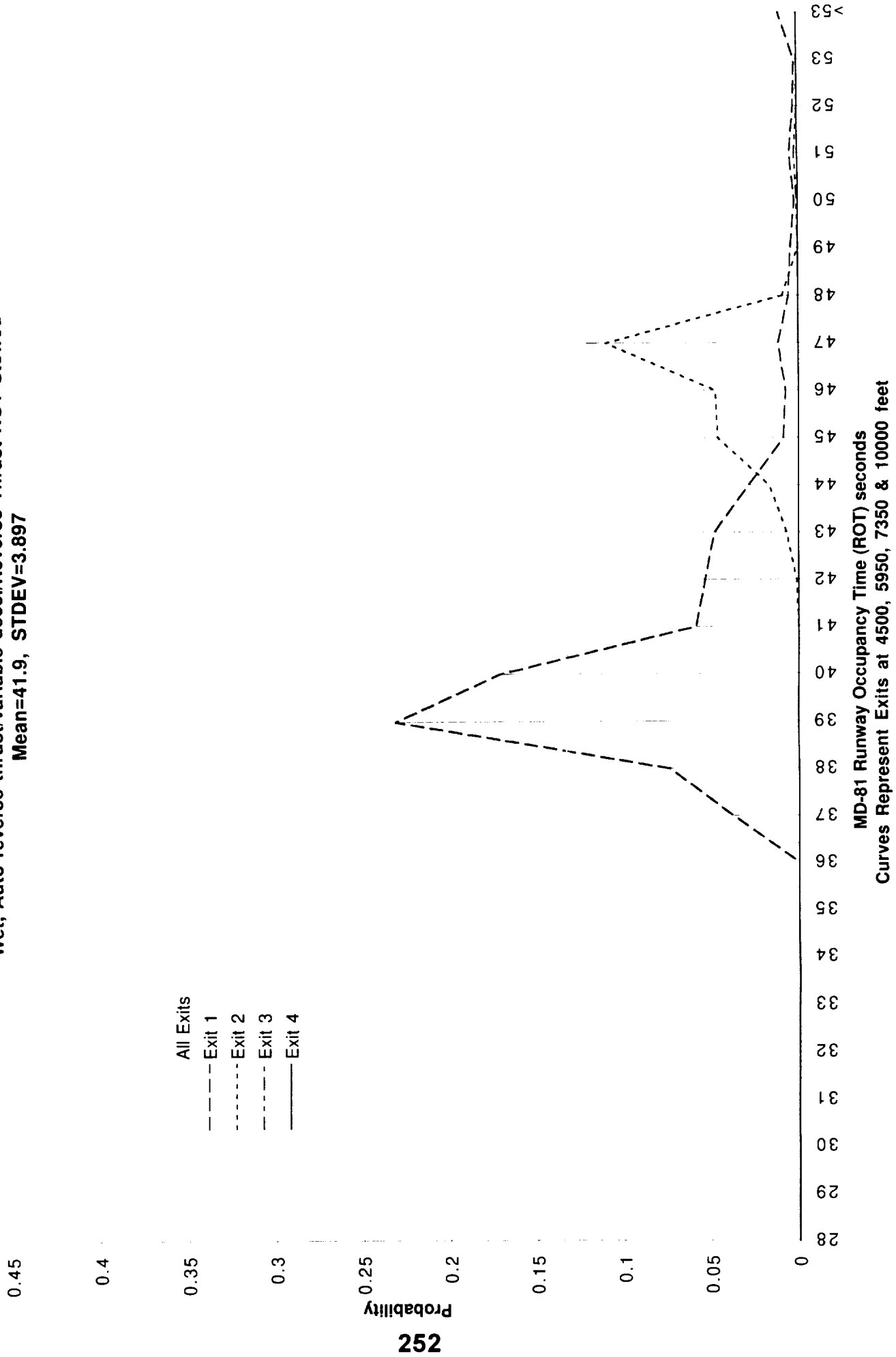
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Reverse Thrust Idle on Exit
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Reverse Thrust NOT Stowed
Mean=41.9, STDEV=3.897



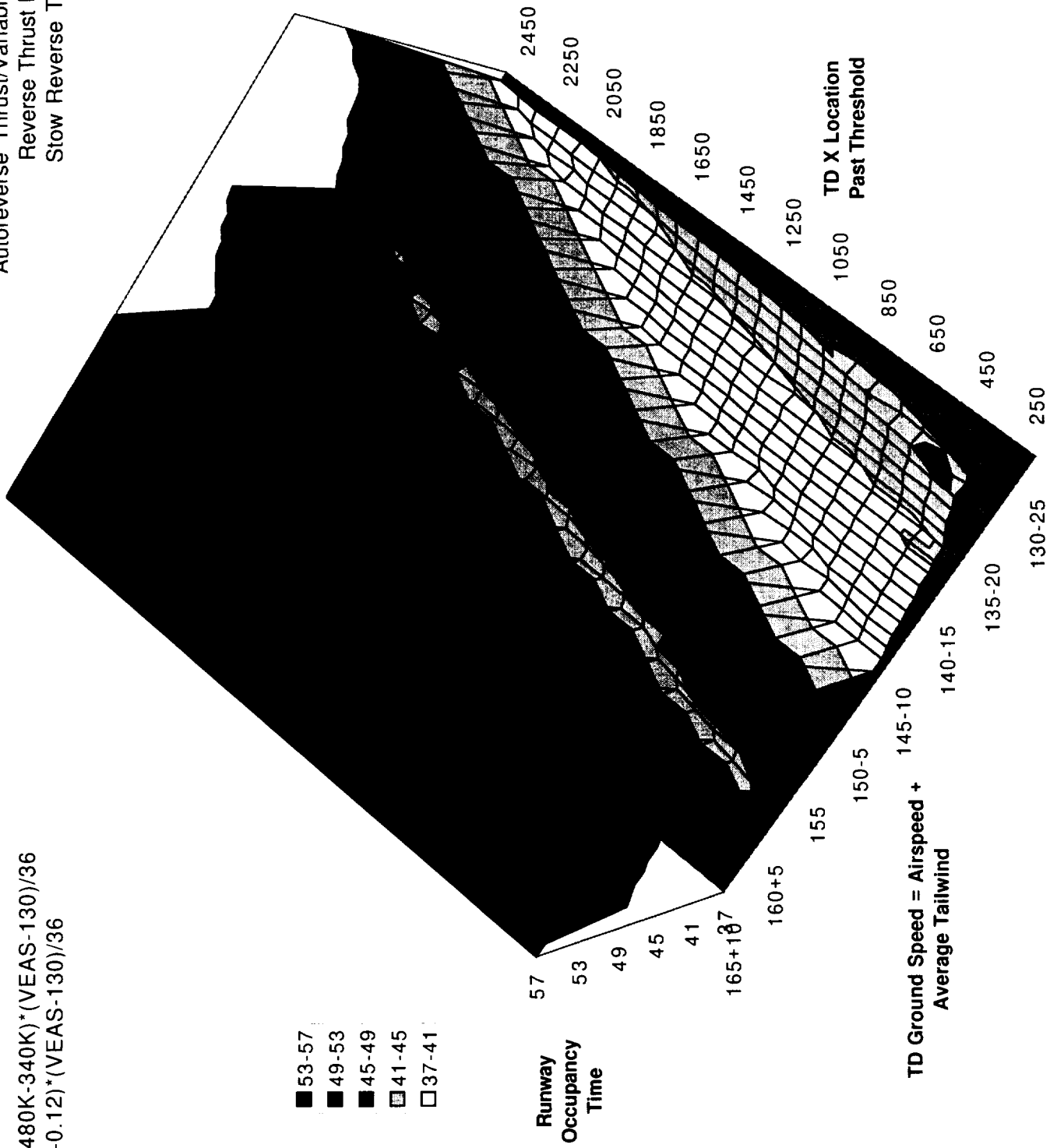
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Reverse Thrust Idle on Runway
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Reverse Thrust Idle on Runway
Mean=48.8, STDEV=5.04

All Exits
Exit 1
Exit 2
Exit 3
Exit 4

0.45

0.4

0.35

0.3

0.25

0.2

0.15

0.1

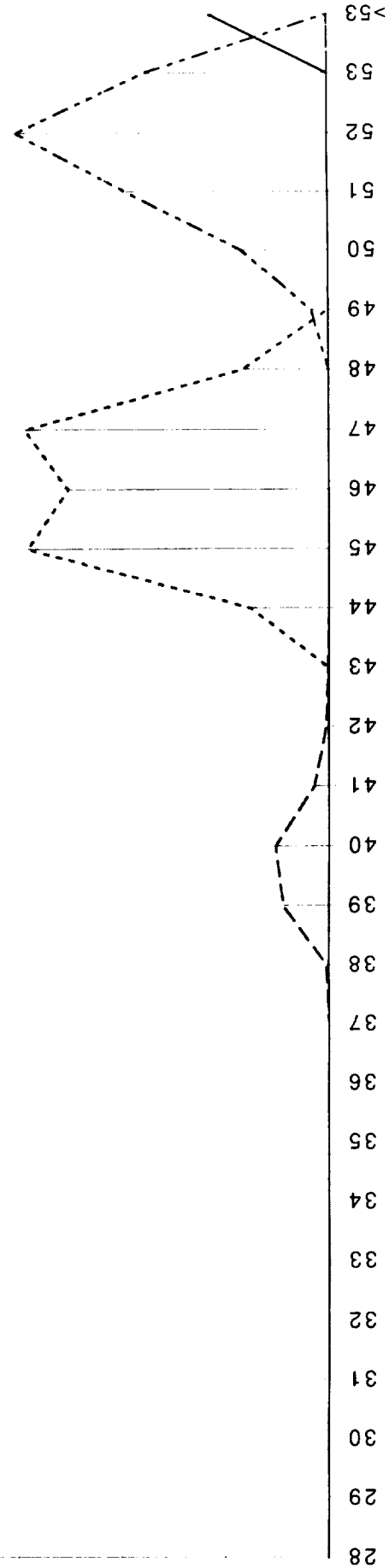
0.05

0

254

28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 >53

MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet



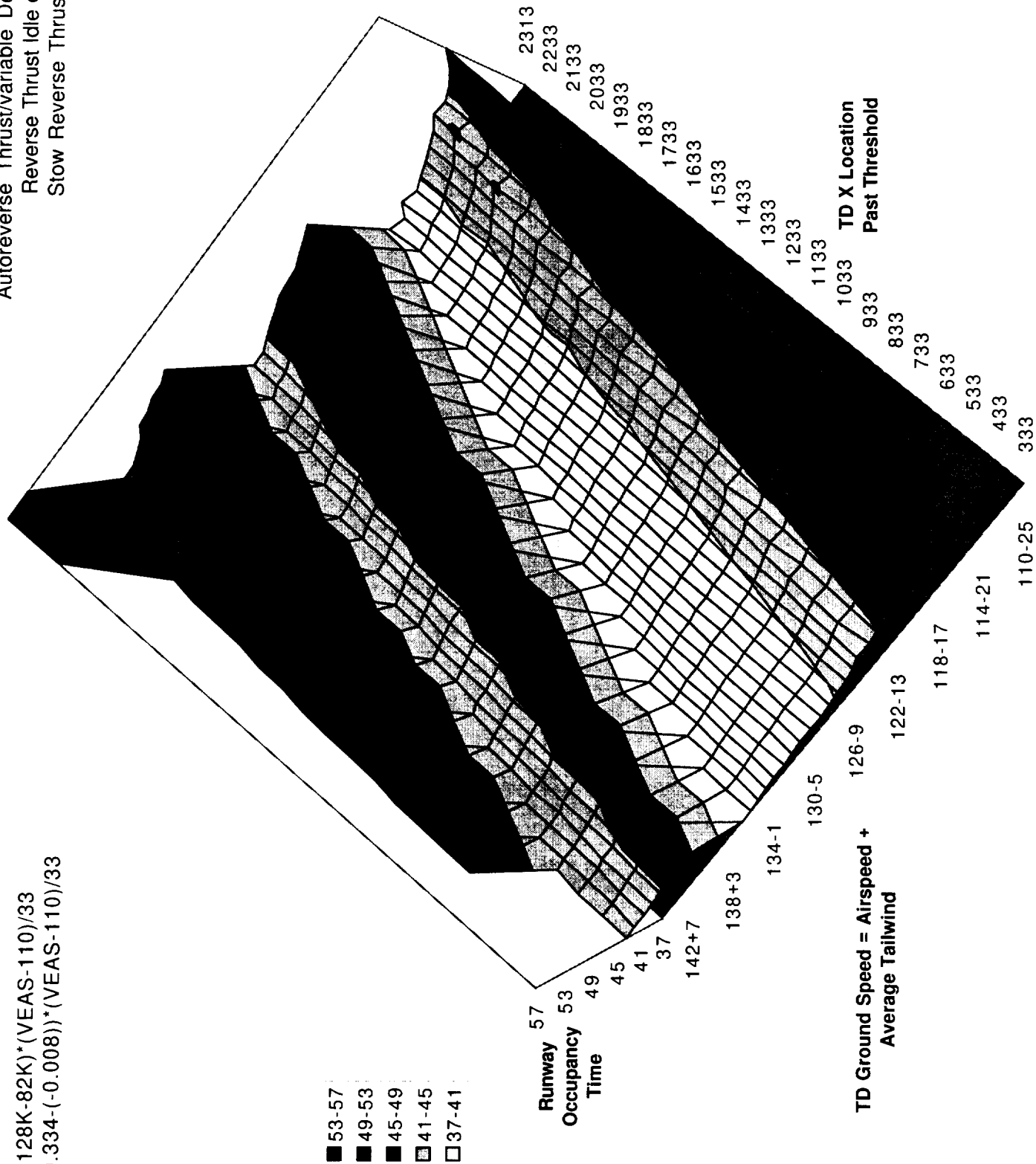
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

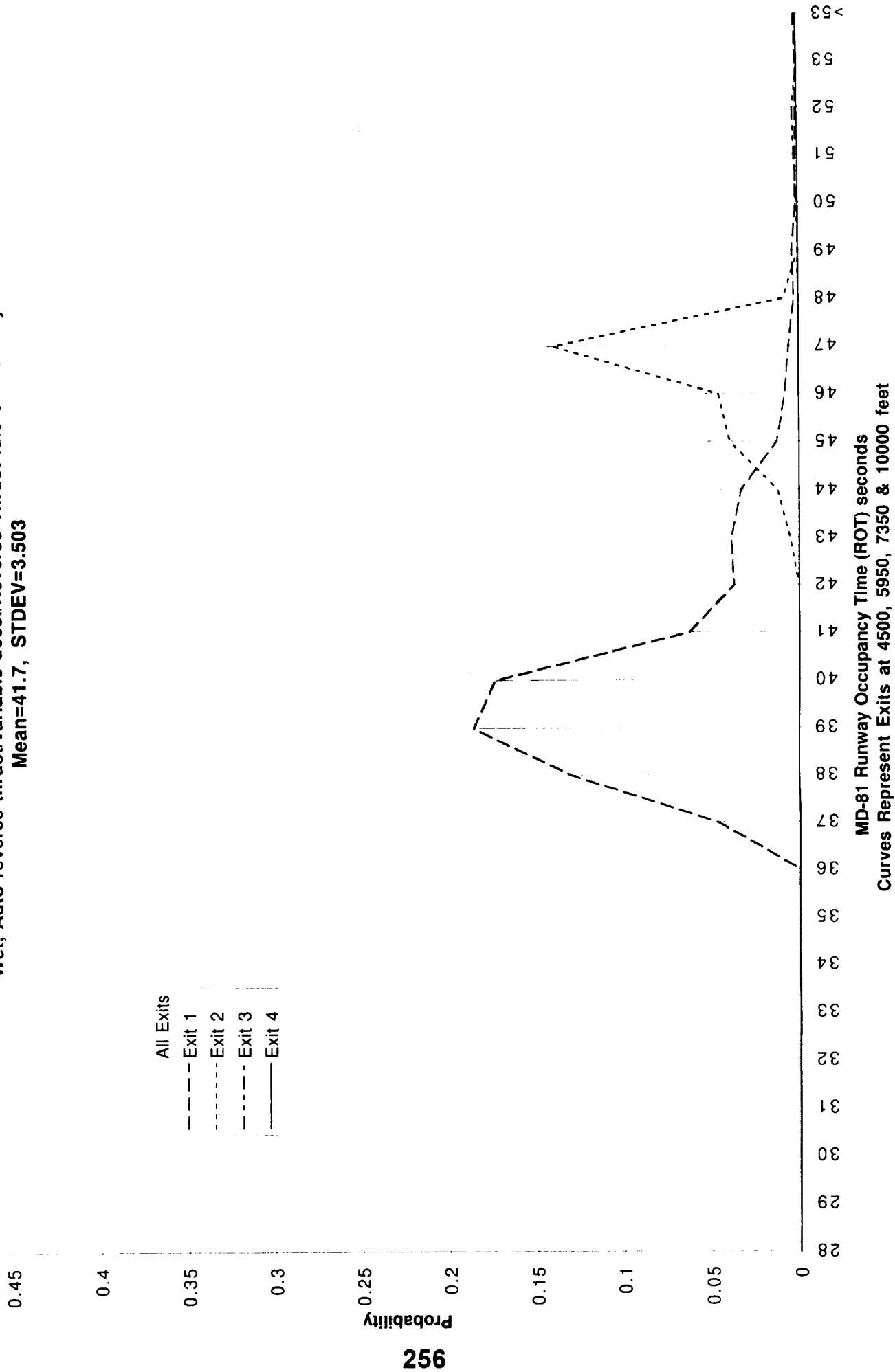
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Reverse Thrust Idle on Runway
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Reverse Thrust Idle on Runway
Mean=41.7, STDEV=3.503



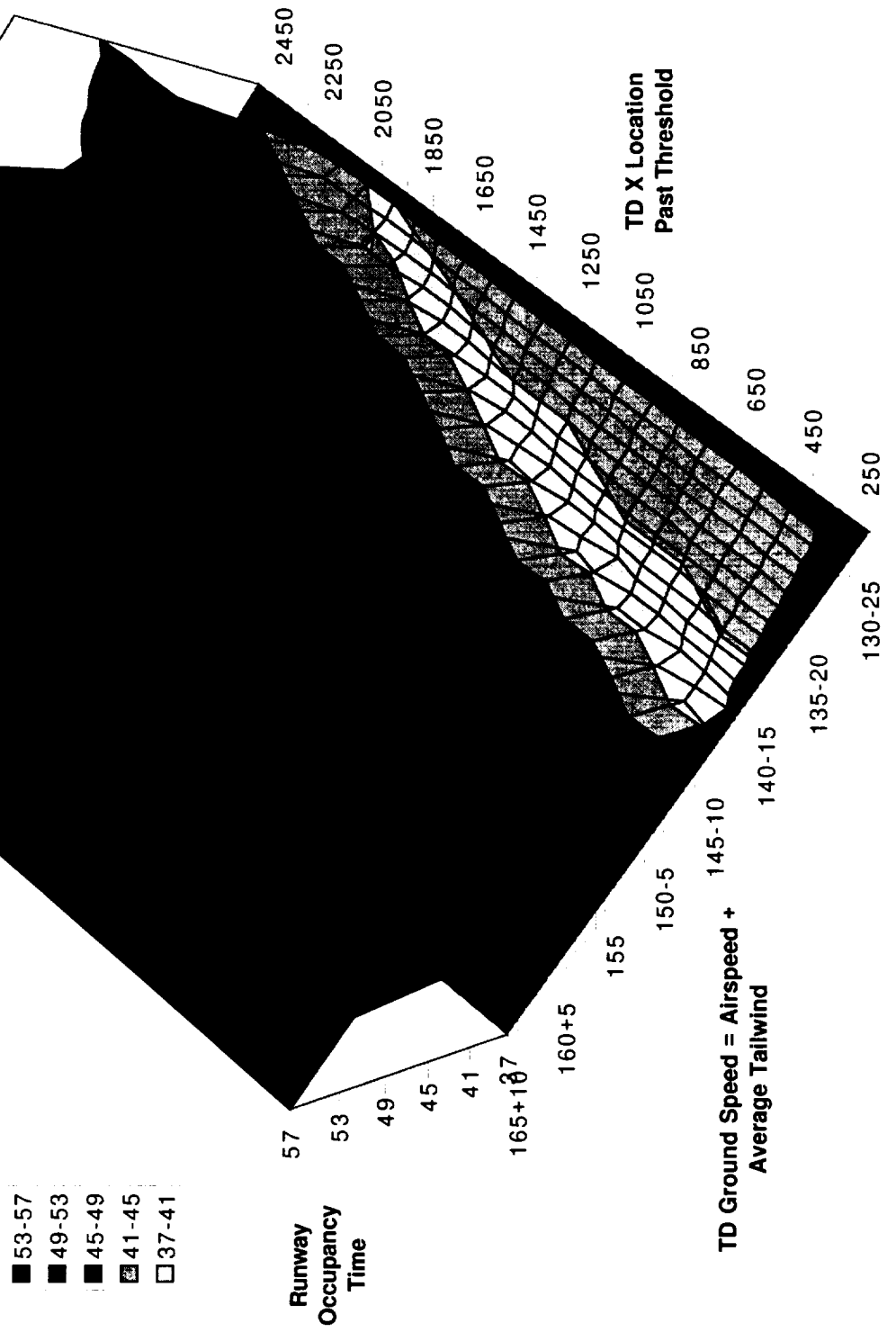
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

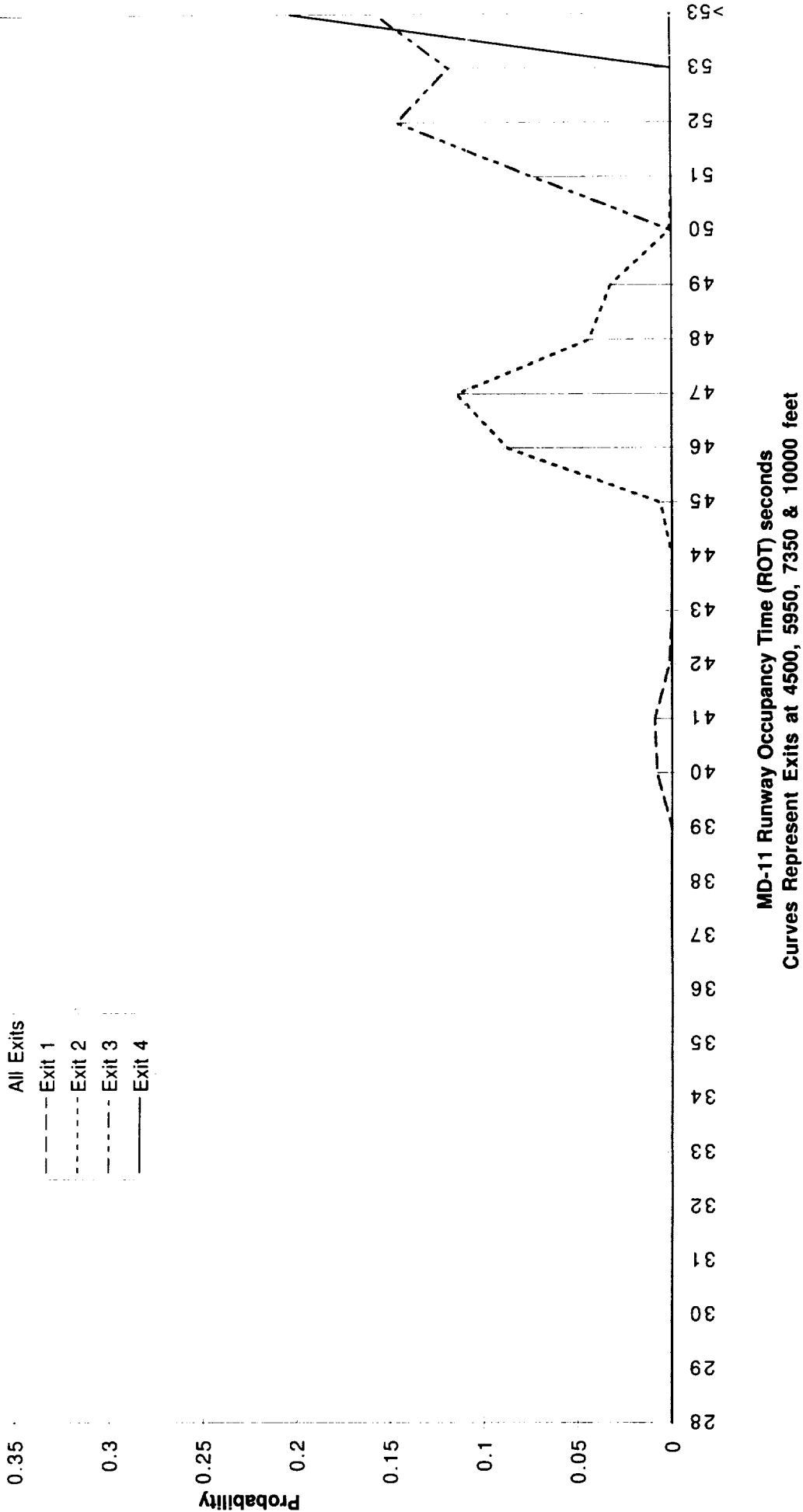
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
NO Reverse Thrust



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/NO Reverse Thrust
Mean=53.3, STDEV=6.61



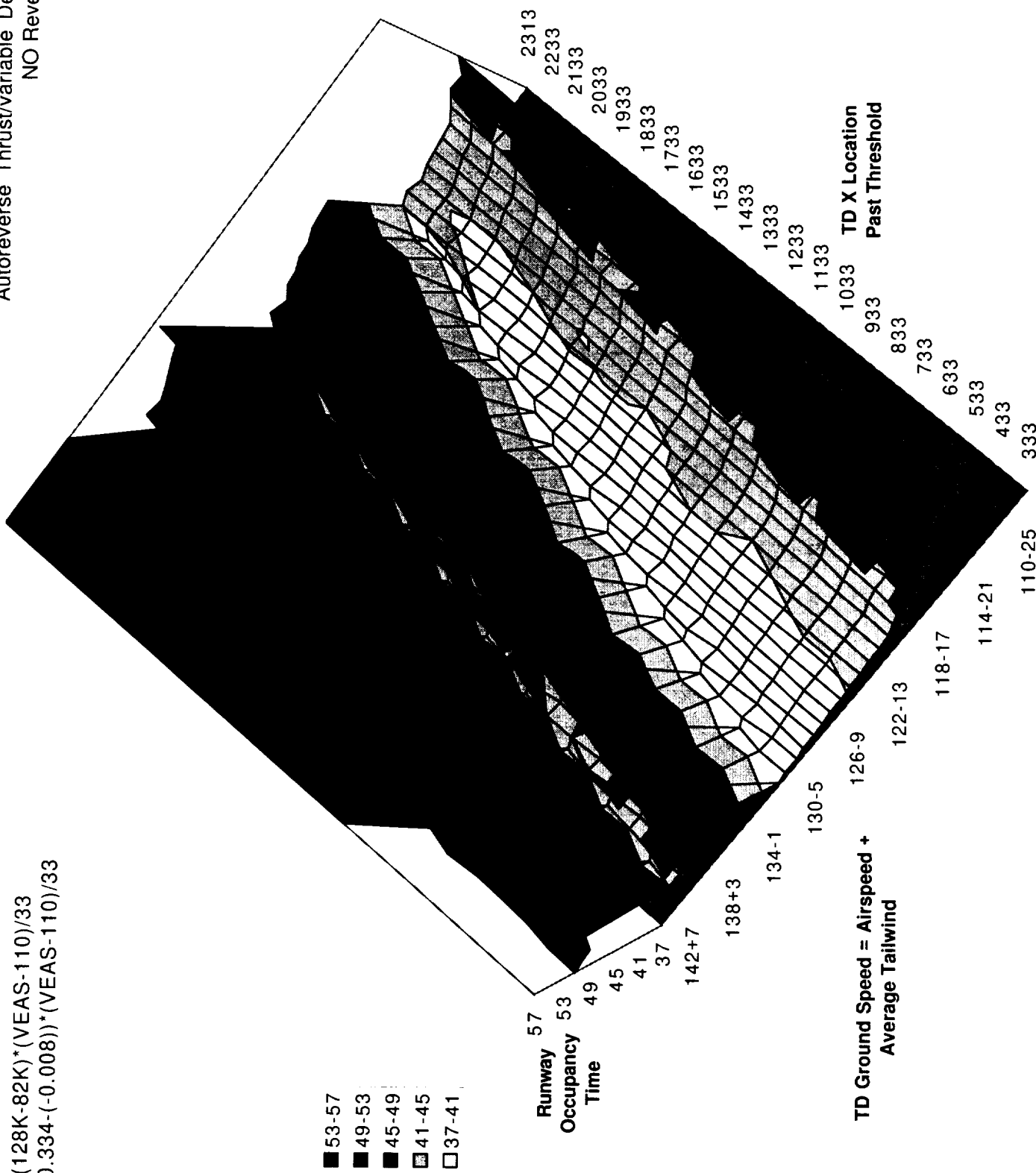
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * ((\text{VEAS} - 110) / 33)$$

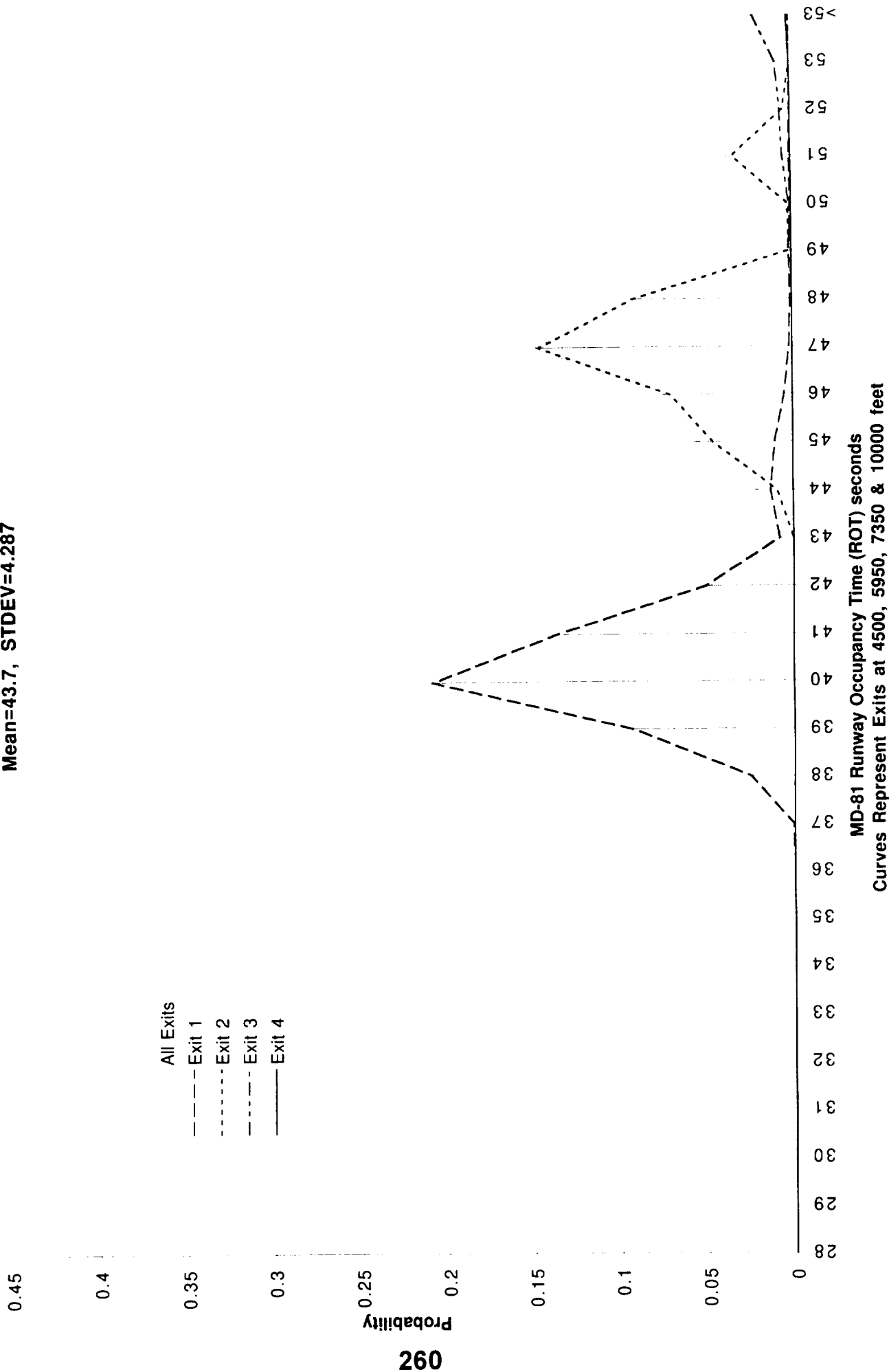
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * ((\text{VEAS} - 110) / 33)$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
NO Reverse Thrust



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/NO Reverse Thrust
Mean=43.7, STDEV=4.287



No exit prediction

MD-11 ROTO Occupancy Time

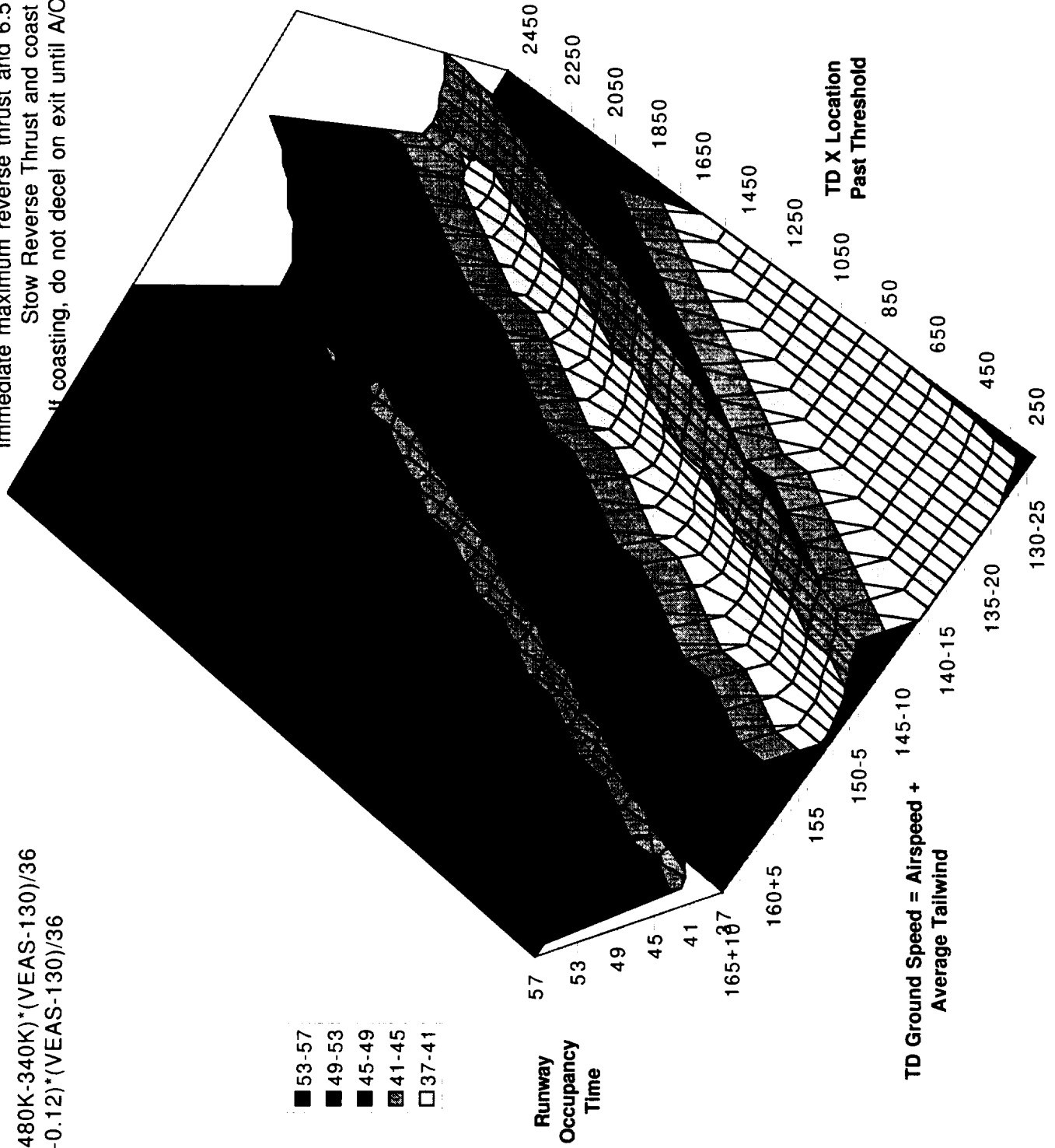
Wet, Exits=3500,4950,6550,10000

Immediate maximum reverse thrust and 6.5 constant decel

$$\text{Weight} = 340K + (480K - 340K) * (VEAS - 130) / 36$$

Stow Reverse Thrust and coast below 70 kt gd
If coasting, do not decel on exit until A/C clears runway

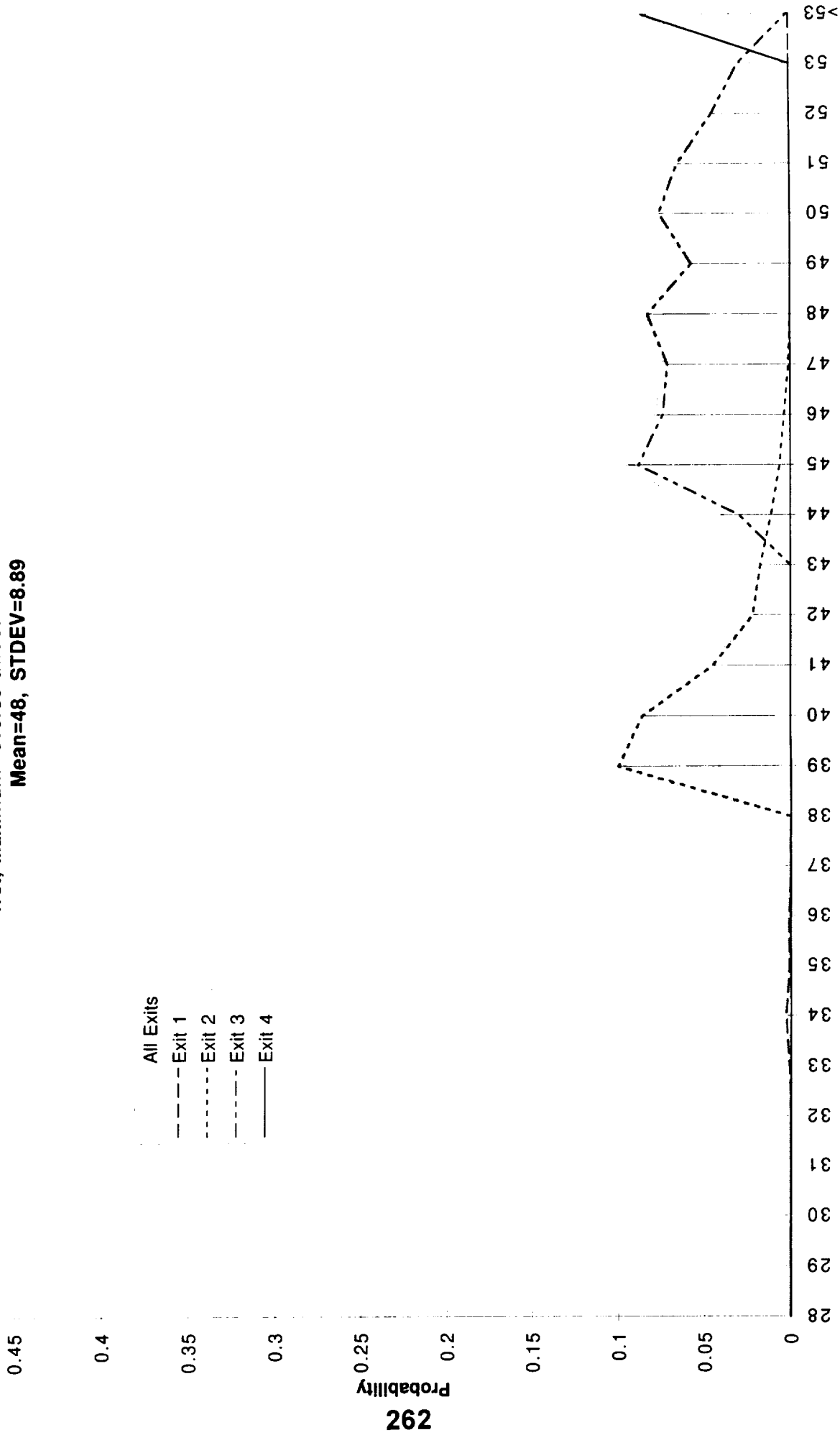
$$CG = 0.12 + (0.34 - 0.12) * (VEAS - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
Wet, Maximum reverse thrust/constant 6.5 decel
Mean=48, STDEV=8.89

- All Exits
- Exit 1
- Exit 2
- Exit 3
- Exit 4

MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 3500, 4950, 6550 & 10000 feet



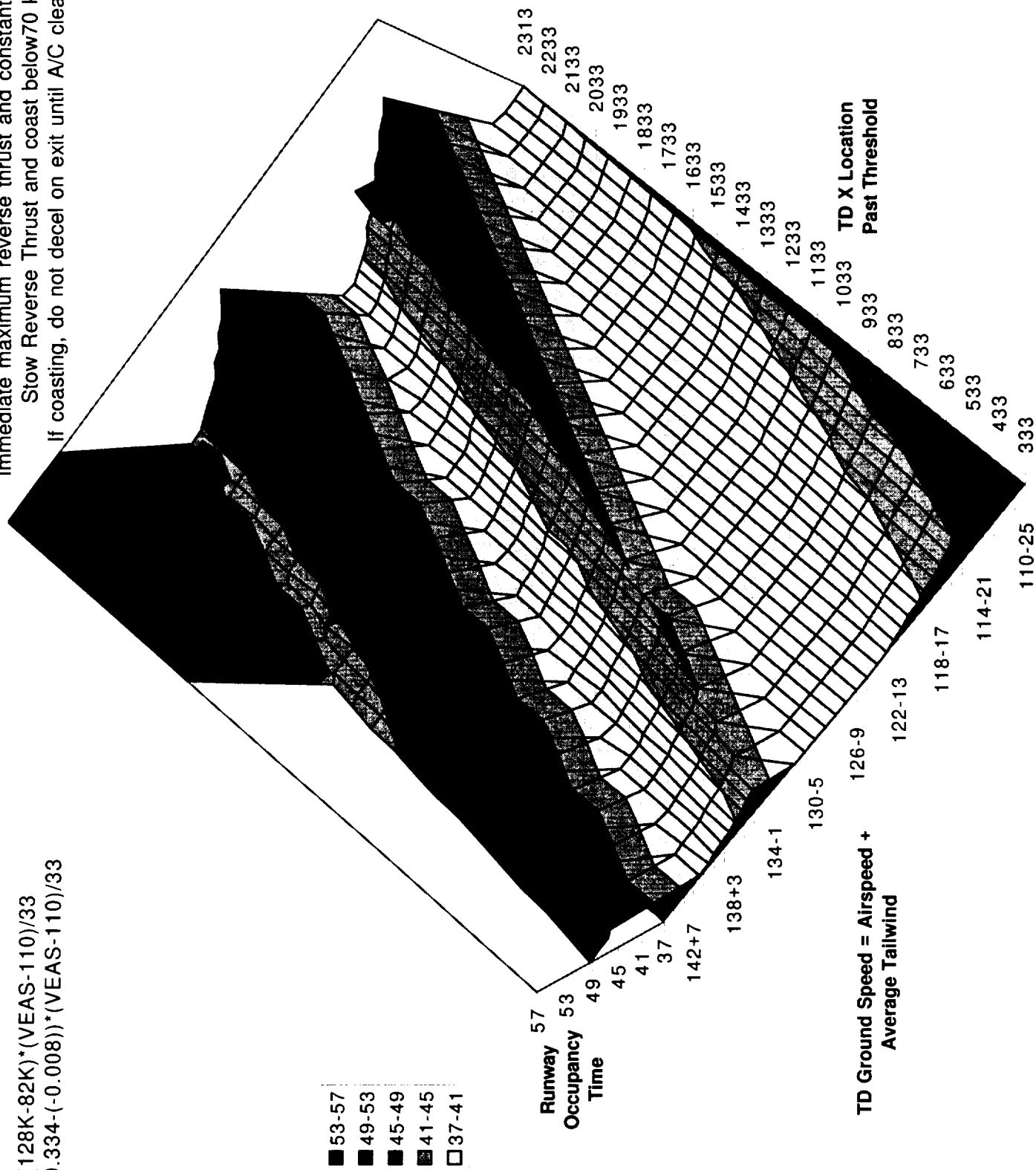
No exit prediction

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

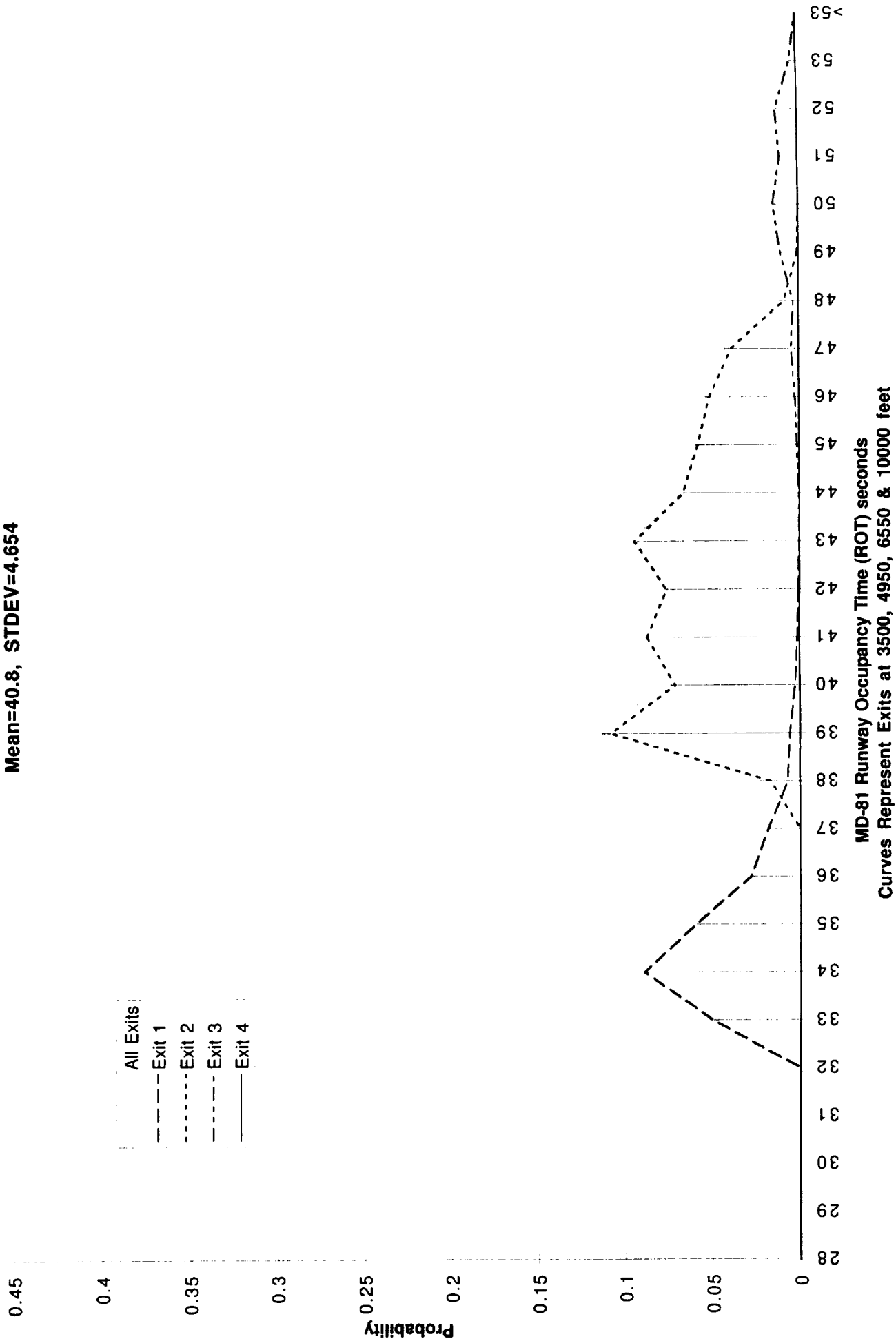
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3500, 4950, 6550, 10000
 Immediate maximum reverse thrust and constant 6.5 decel
 Stow Reverse Thrust and coast below 70 kt gnd spd
 If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
Wet, Maximum reverse thrust/constant 6.5 decel
Mean=40.8, STDEV=4.654



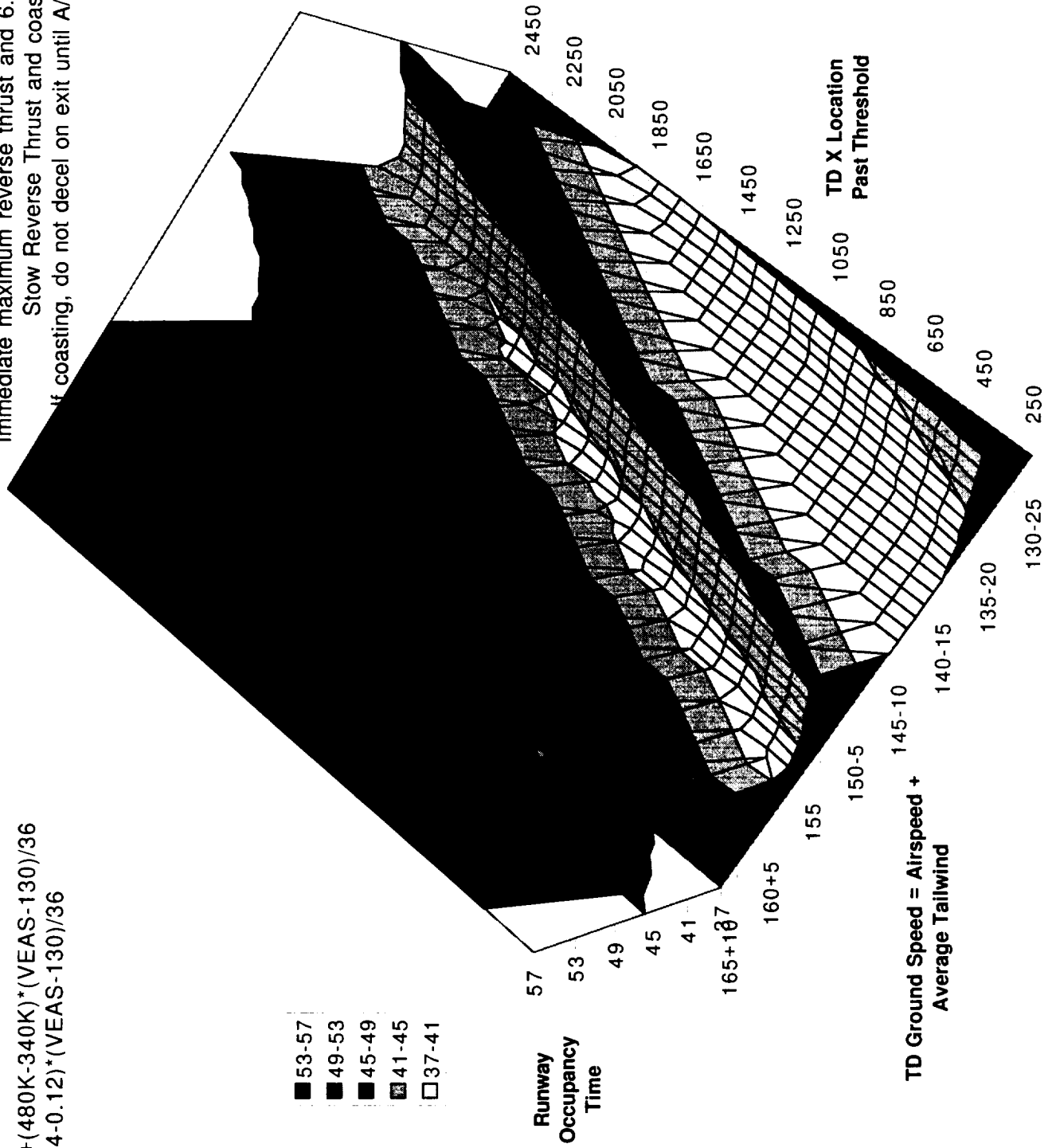
No exit prediction

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

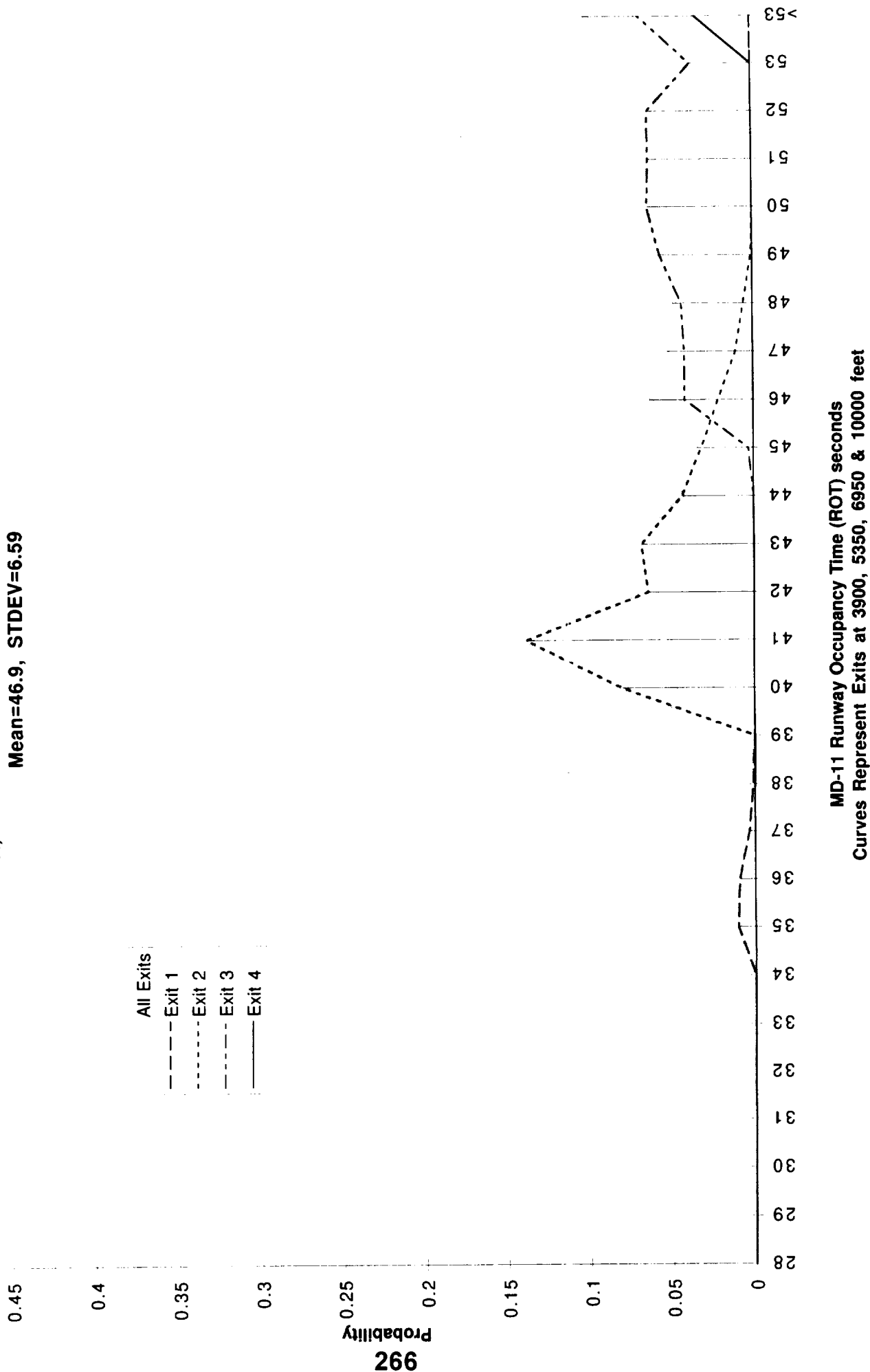
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
 Immediate maximum reverse thrust and 6.5 constant decel
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
Wet, Maximum reverse thrust/constant 6.5 decel
Mean=46.9, STDEV=6.59



No exit prediction

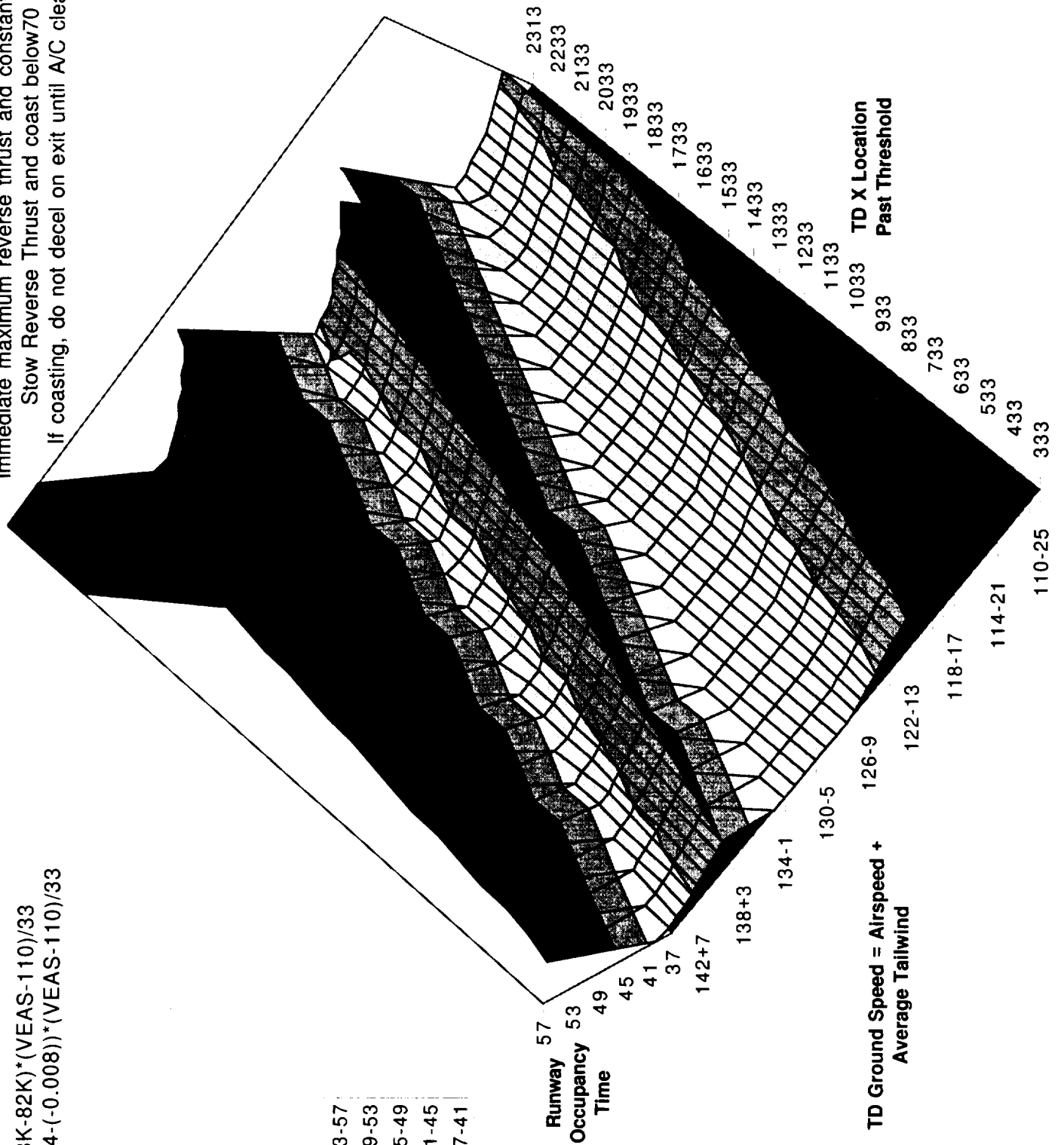
MD-81 ROTO Occupancy Time

Wet, Exits=3900,5350,6950,10000
 Immediate maximum reverse thrust and constant 6.5 decel
 Stow Reverse Thrust and coast below 70 kt gnd spd
 If coasting, do not decel on exit until A/C clears runway

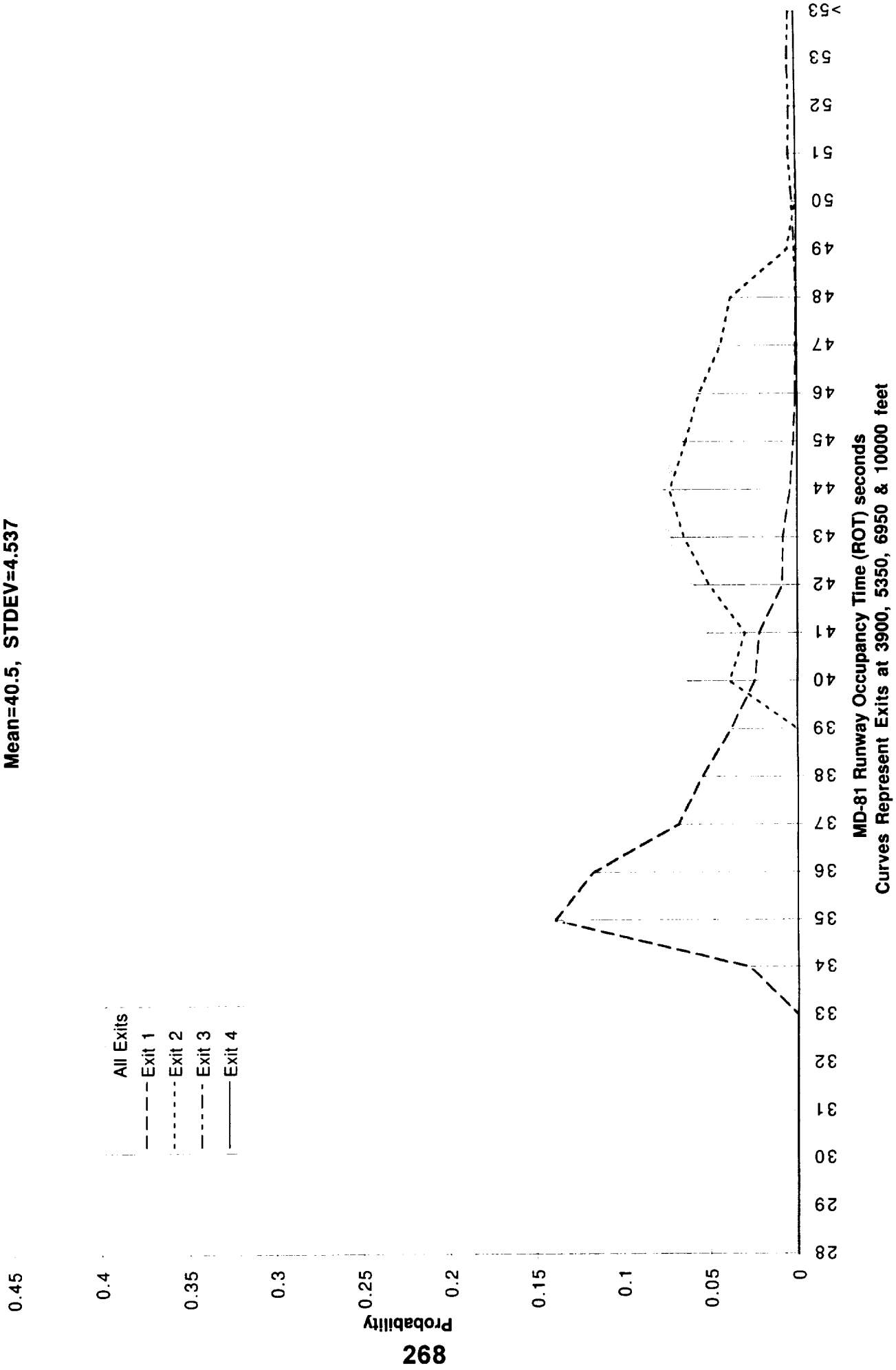
$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-81 ROTO ROT Probability Distribution
Wet, Maximum reverse thrust/constant 6.5 decel
Mean=40.5, STDEV=4.537



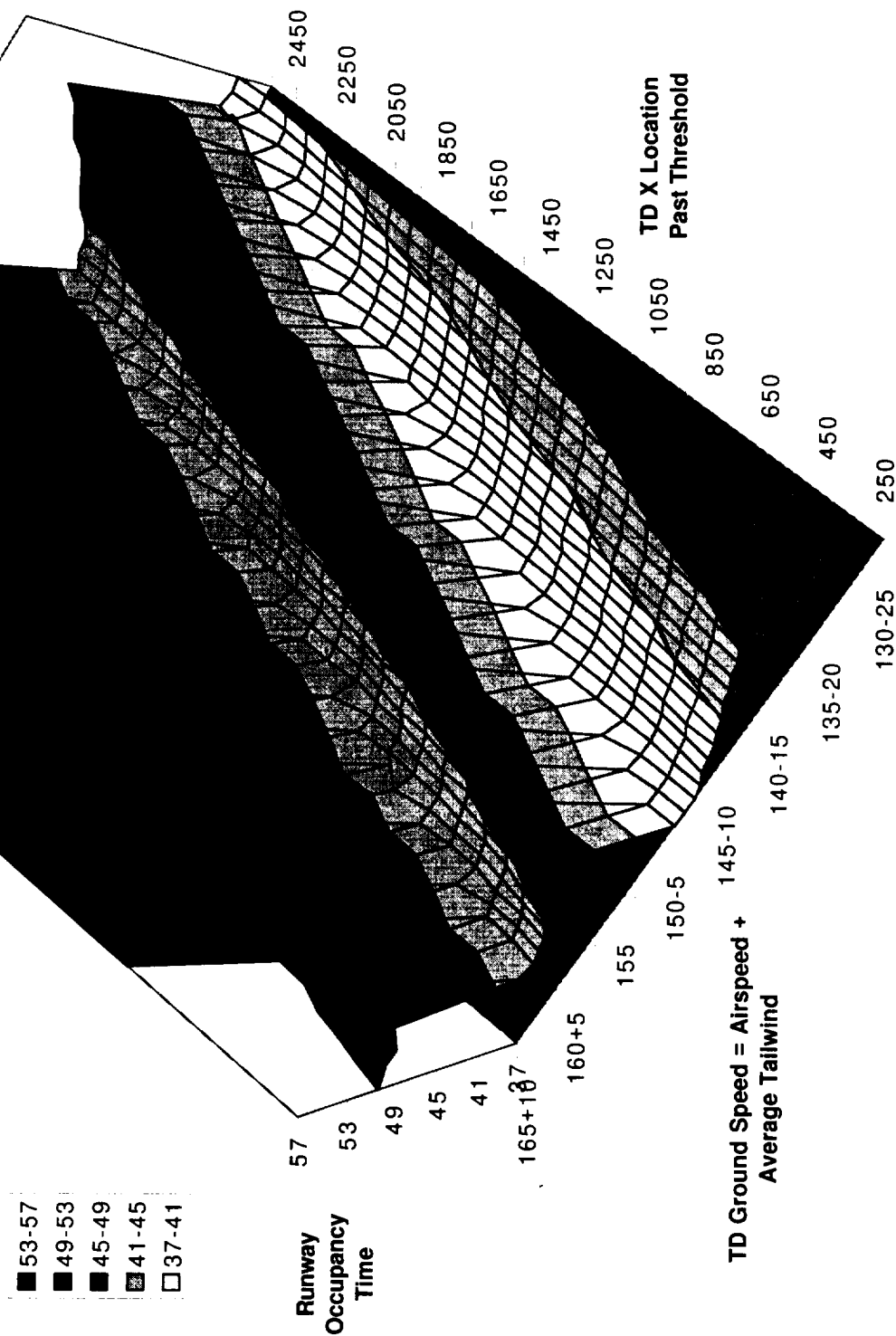
No exit prediction

MD-11 ROTO Occupancy Time

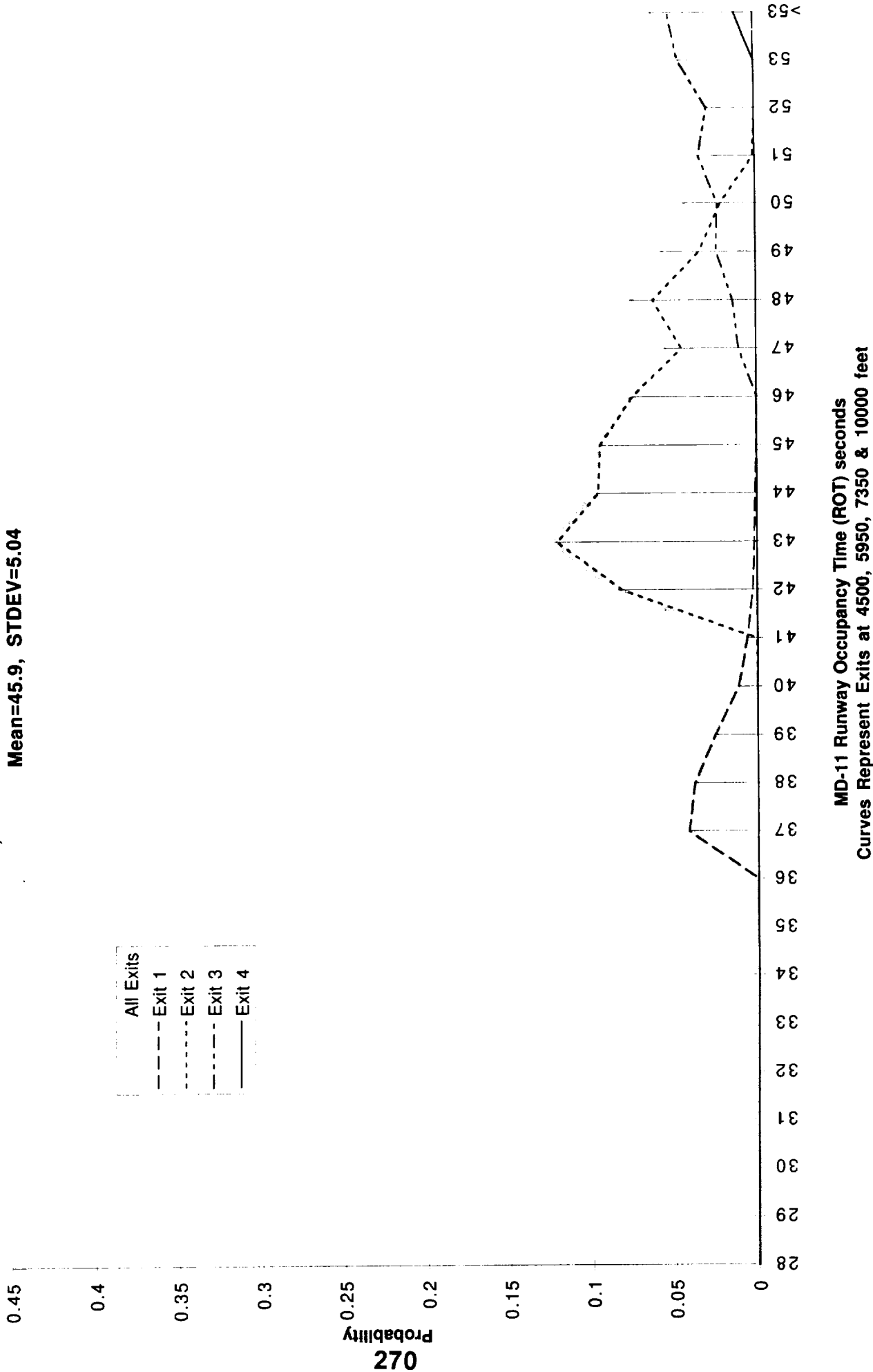
Wet, Exits=4500, 5950, 7350, 10000
 Immediate maximum reverse thrust and 6.5 constant decel
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$



MD-11 ROTO ROT Probability Distribution
Wet, Maximum reverse thrust/constant 6.5 decel
Mean=45.9, STDEV=5.04



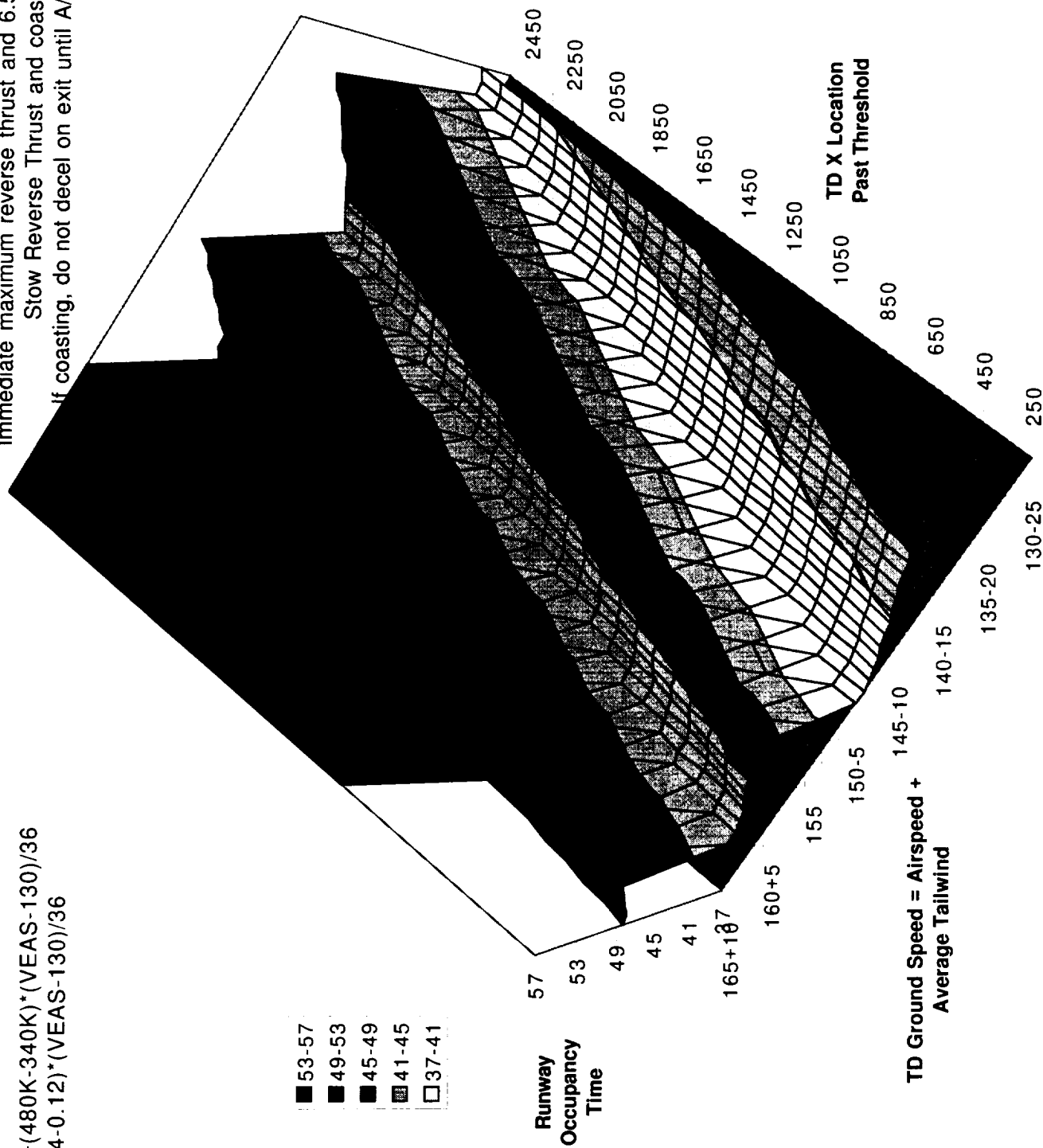
No exit prediction

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

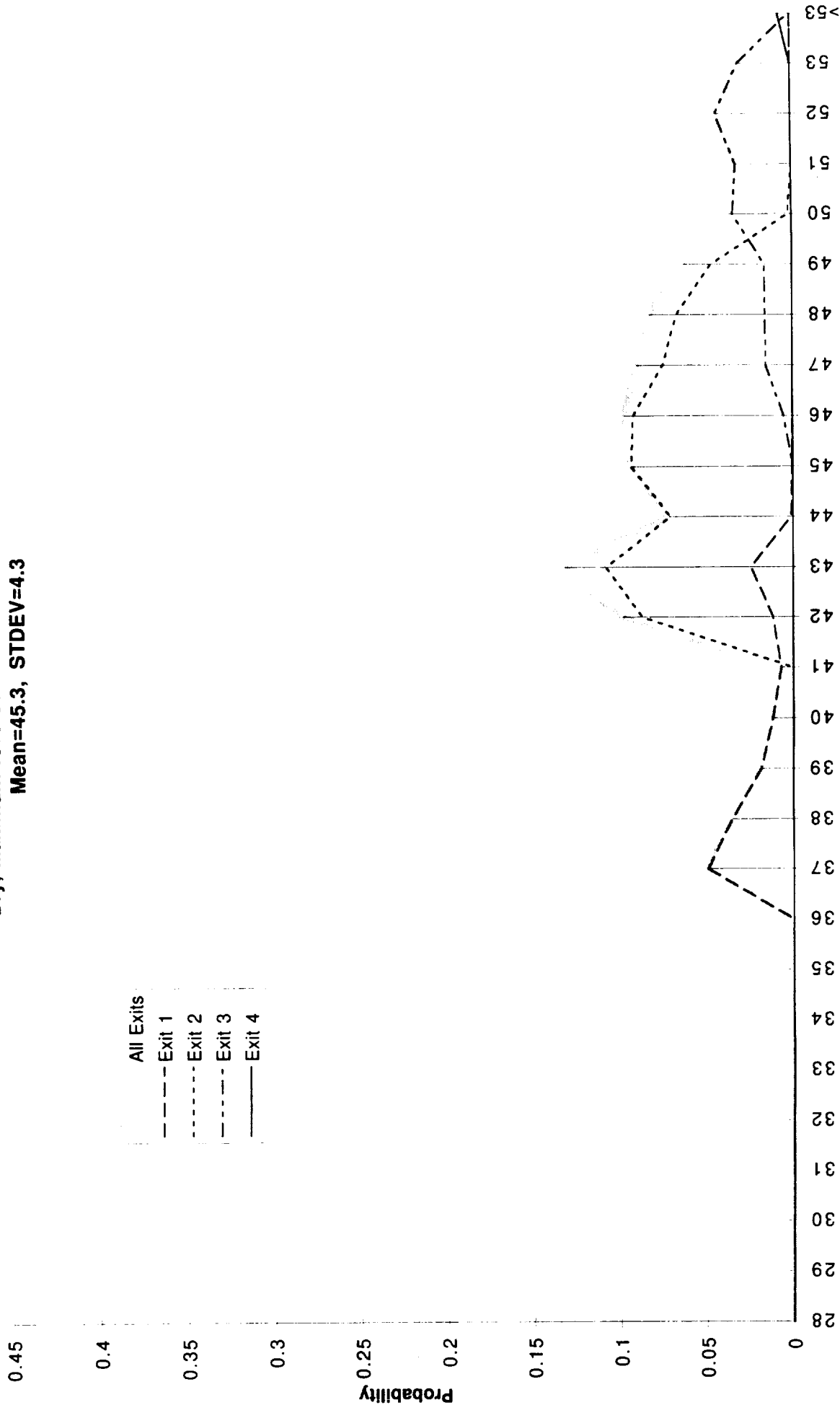
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
 Immediate maximum reverse thrust and 6.5 constant decel
 Stow Reverse Thrust and coast below 70 kt gd
 If coasting, do not decel on exit until A/C clears runway



MD-11 ROTO ROT Probability Distribution
 Dry, Maximum reverse thrust/constant 6.5 decel
 Mean=45.3, STDEV=4.3



MD-11 Runway Occupancy Time (ROT) seconds
 Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

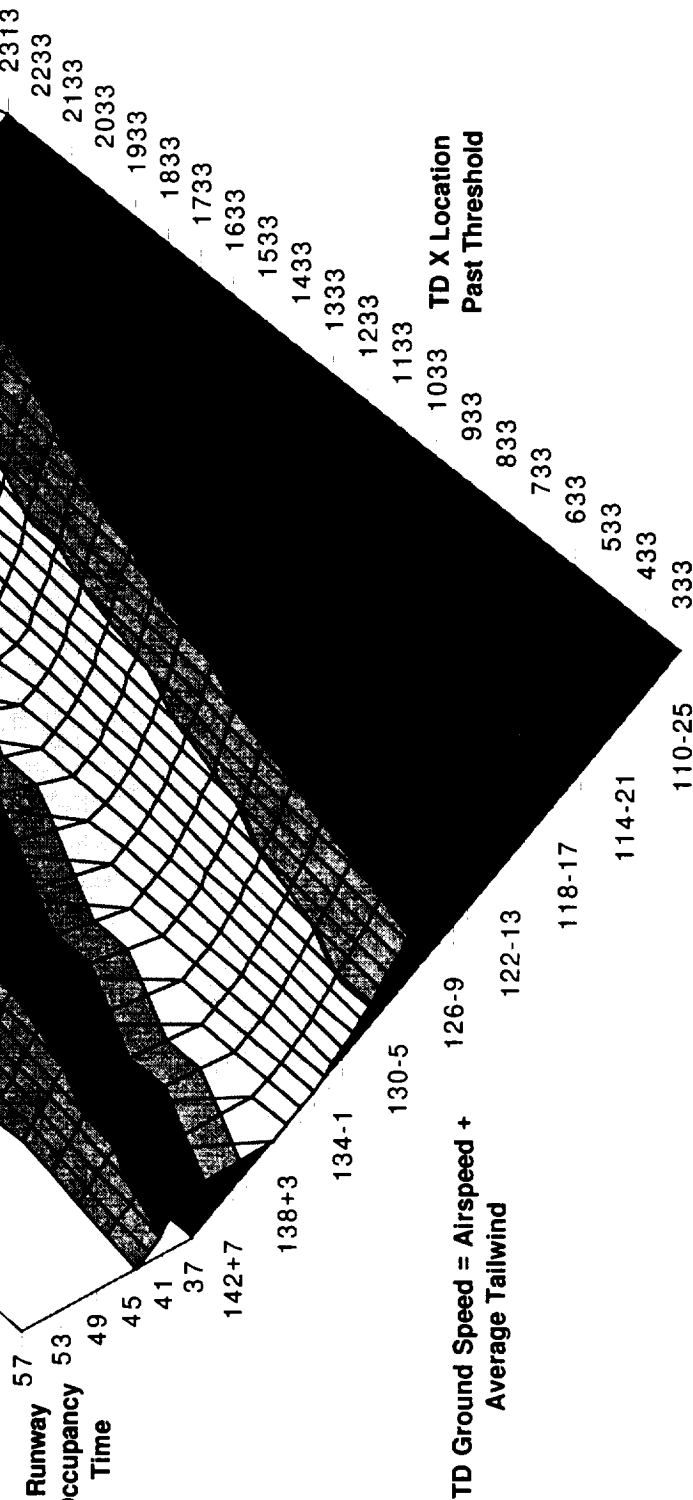
No exit prediction

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

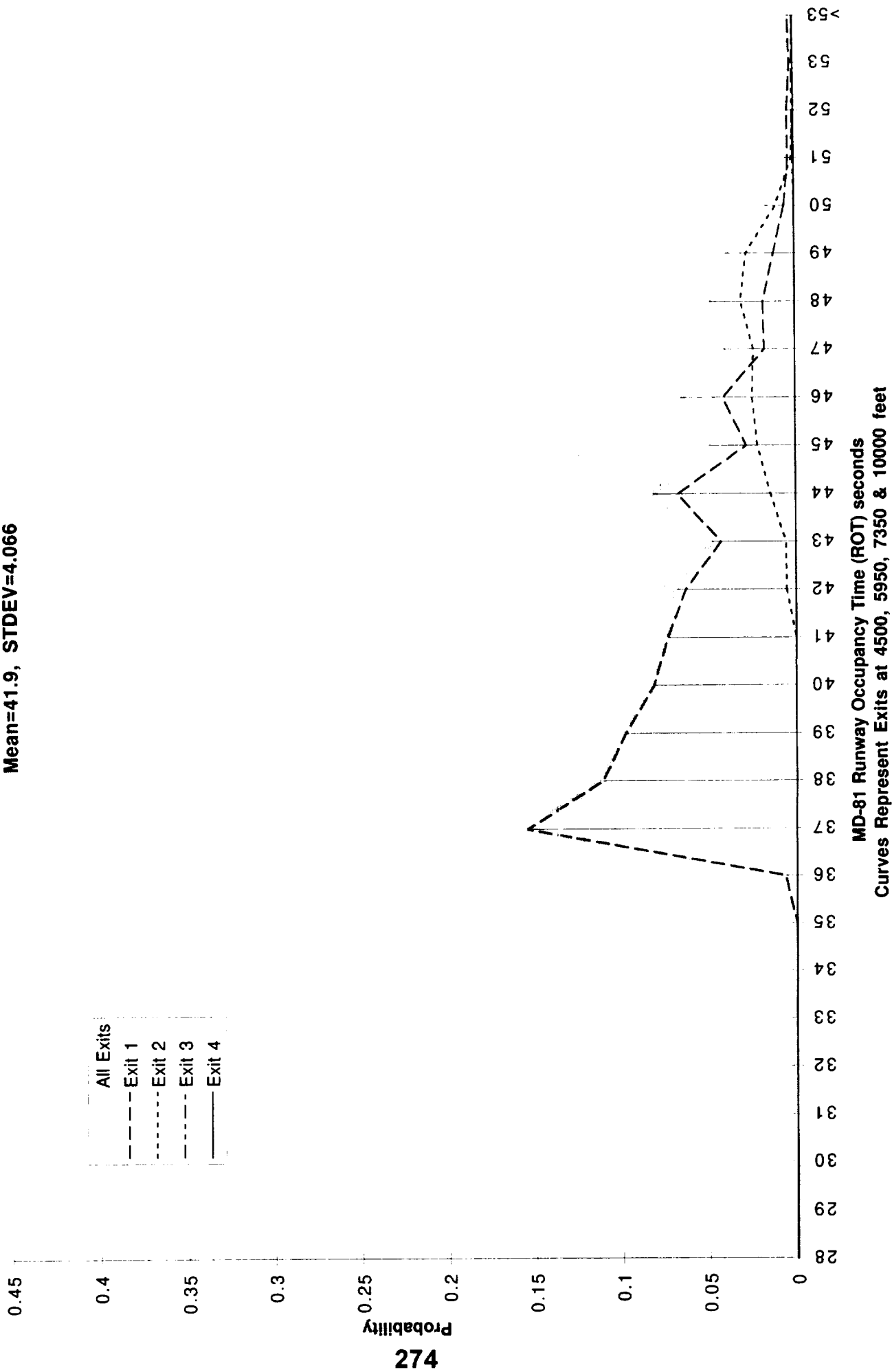
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500,5950,7350,10000
 Immediate maximum reverse thrust and constant 6.5 decel
 Stow Reverse Thrust and coast below 70 kt gnd spd
 If coasting, do not decel on exit until A/C clears runway



MD-81 ROTO ROT Probability Distribution
Wet, Maximum reverse thrust/constant 6.5 decel
Mean=41.9, STDEV=4.066



No exit prediction

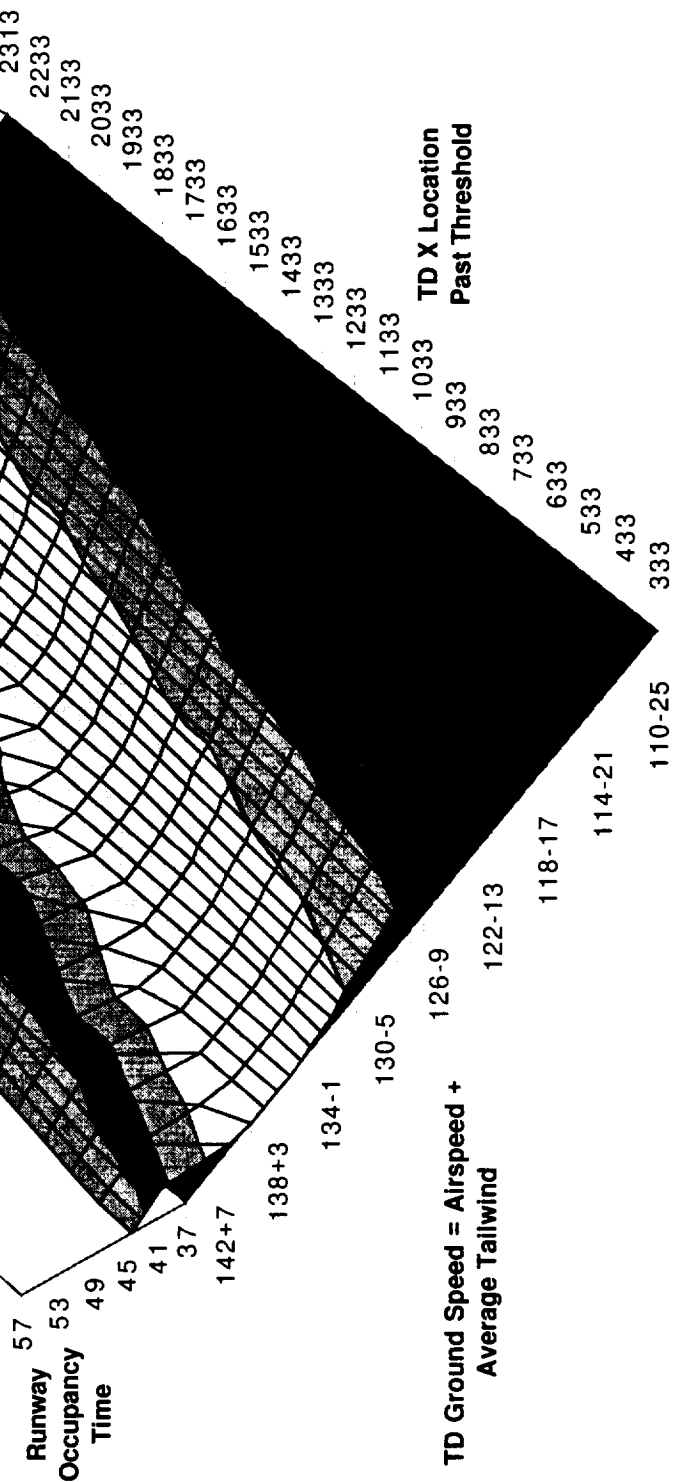
$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

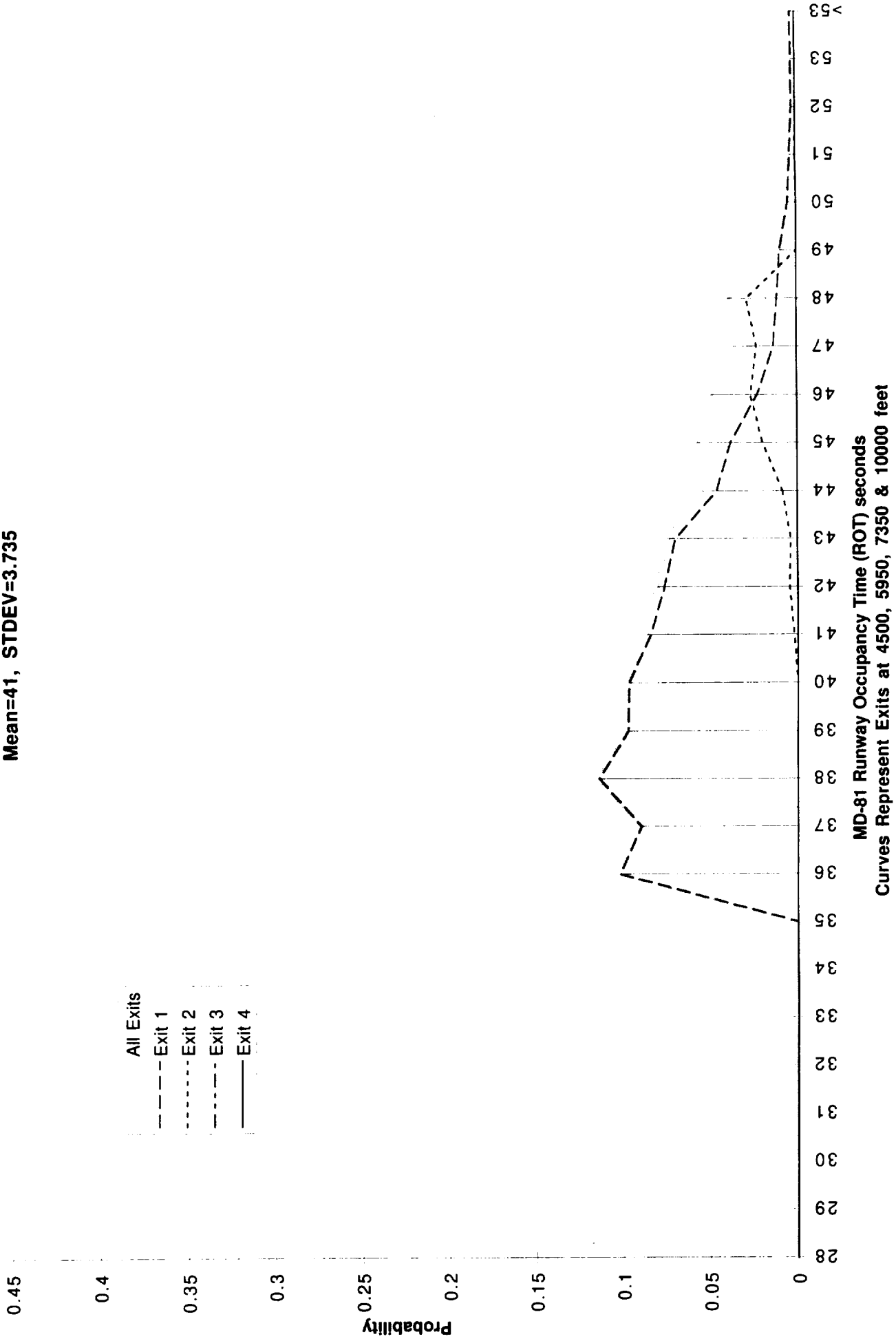
MD-81 ROTO Occupancy Time

Dry, Exits=4500, 5950, 7350, 10000
 Immediate maximum reverse thrust and constant 6.5 decel
 Stow Reverse Thrust and coast below 70 kt gnd spd
 If coasting, do not decel on exit until A/C clears runway

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41



MD-81 ROTO ROT Probability Distribution
 Dry, Maximum reverse thrust/constant 6.5 decel
 Mean=41, STDEV=3.735



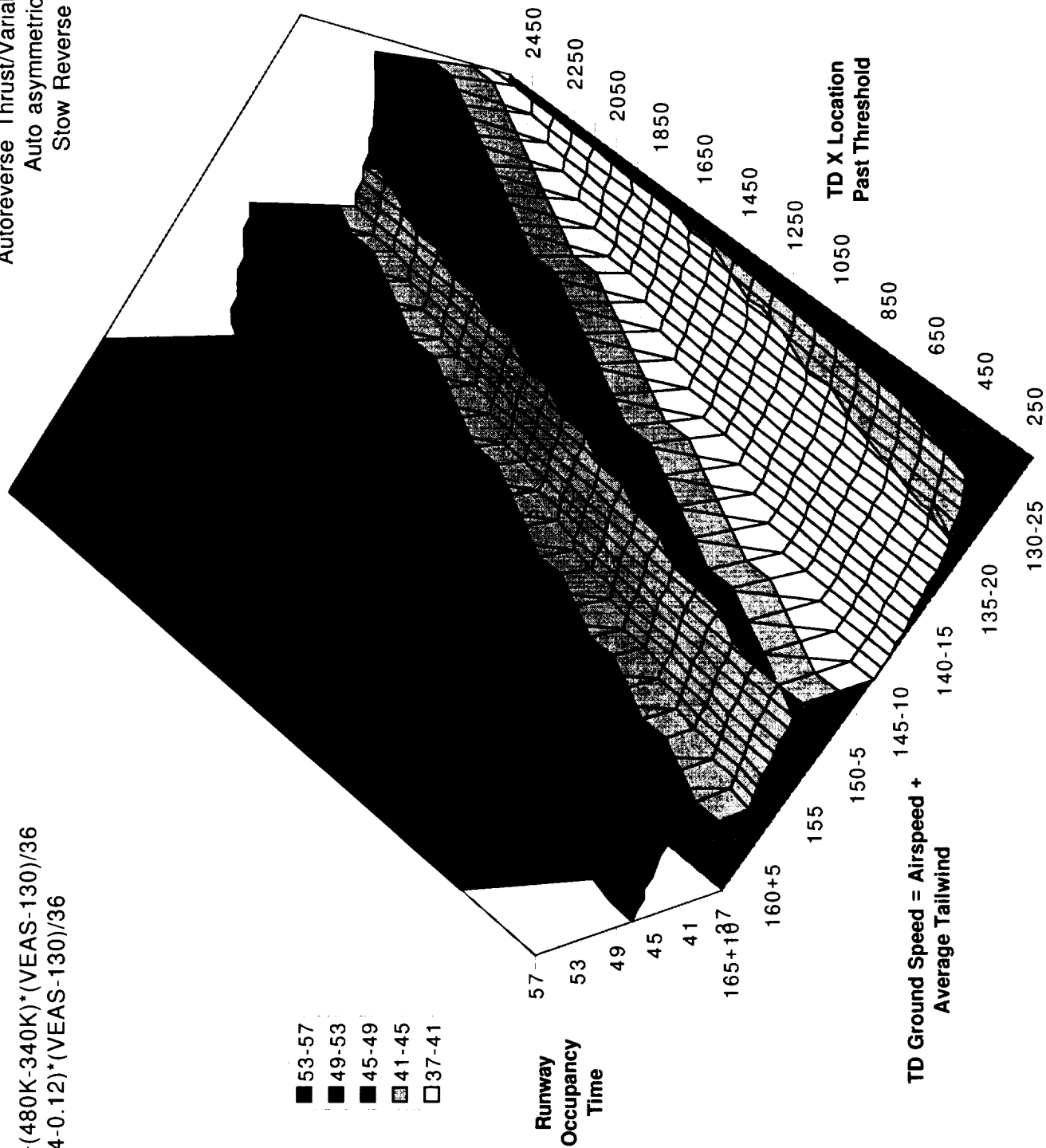
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

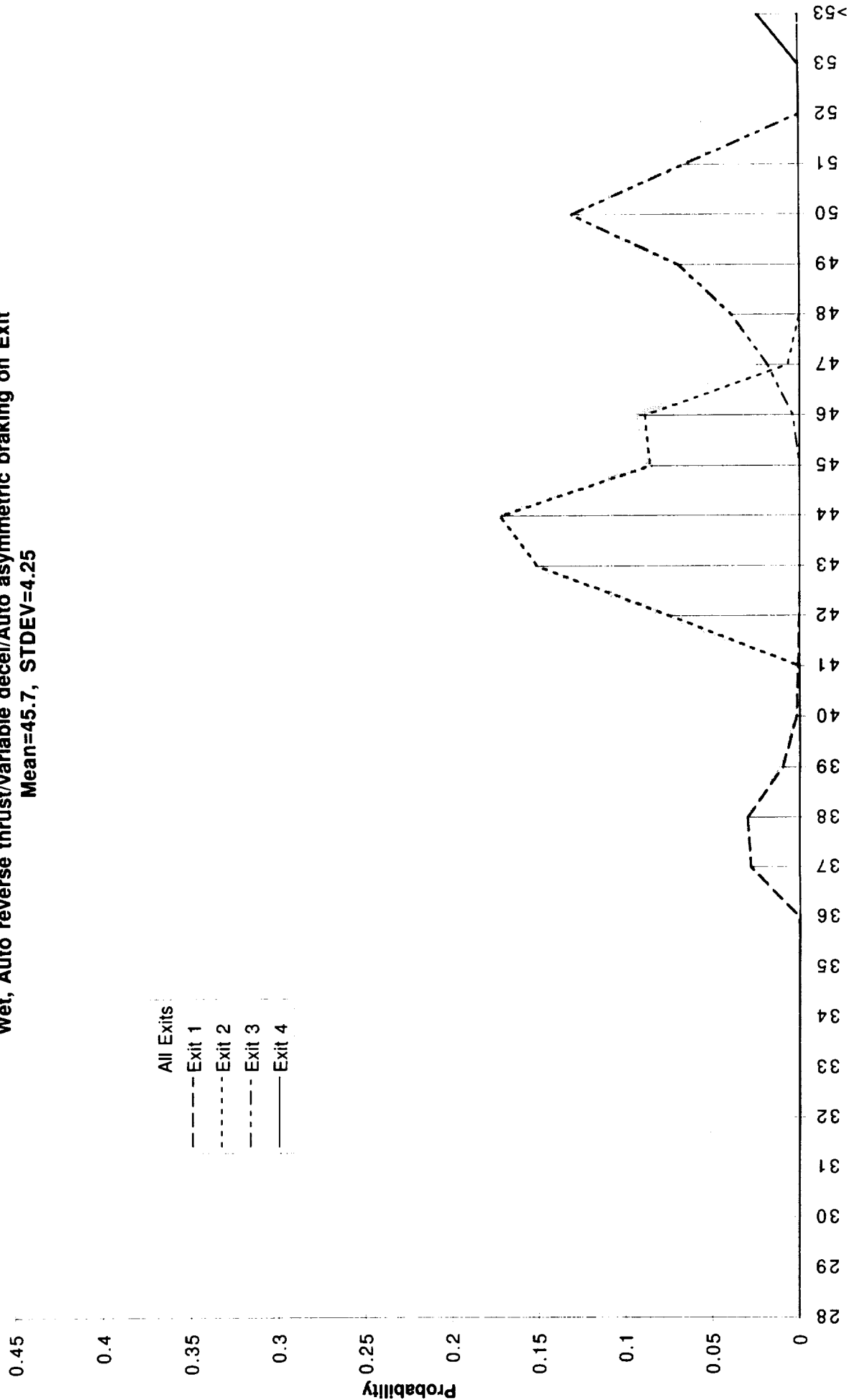
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Auto asymmetric braking on Exit
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Auto asymmetric braking on Exit
Mean=45.7, STDEV=4.25



MD-11 Runway Occupancy Time (ROT) seconds
Curves Represent Exits at 4500, 5950, 7350 & 10000 feet

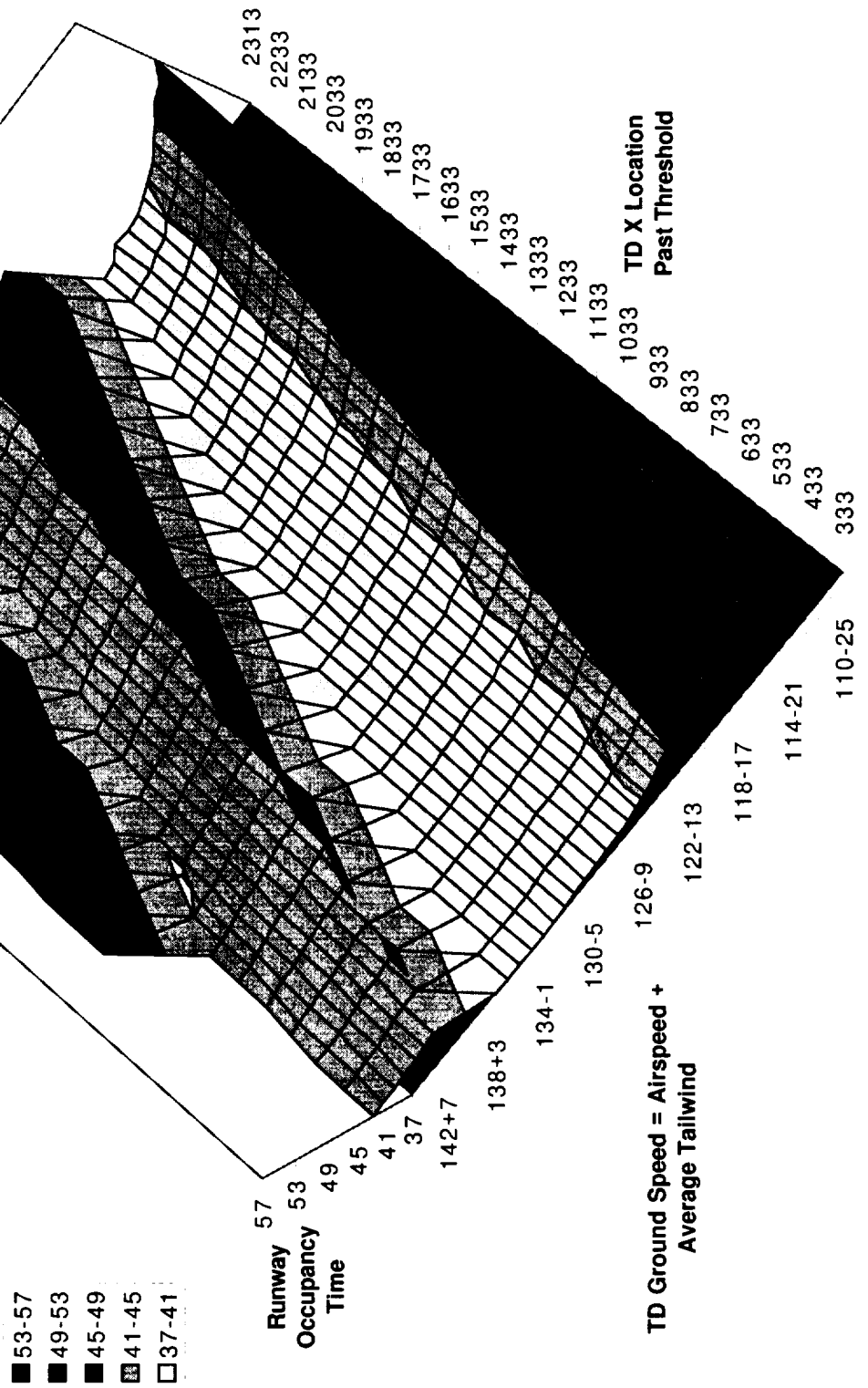
Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

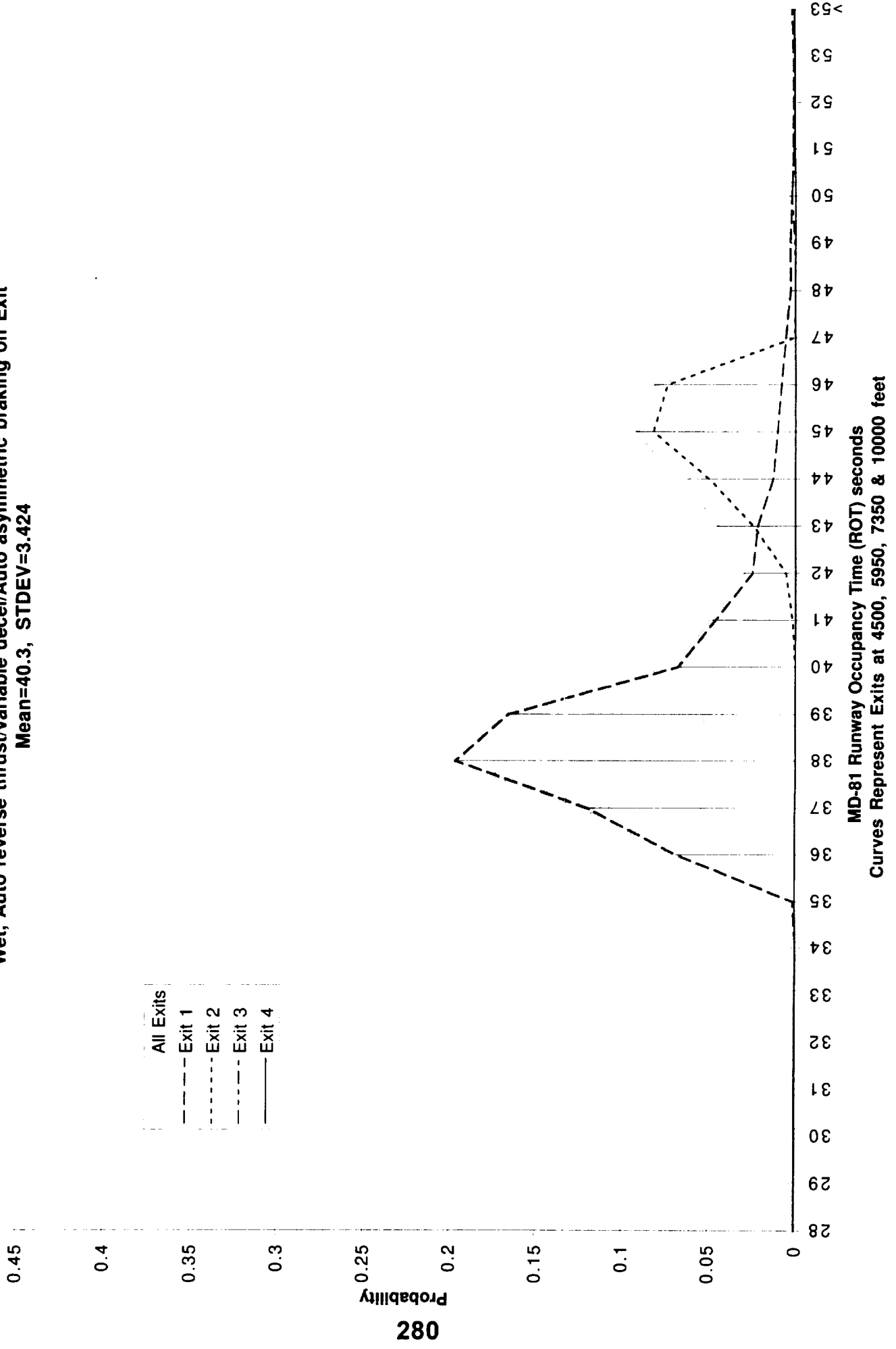
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Auto asymmetric braking on Exit
Stow Reverse Thrust=70 kt gd



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Auto asymmetric braking on Exit
Mean=40.3, STDEV=3.424



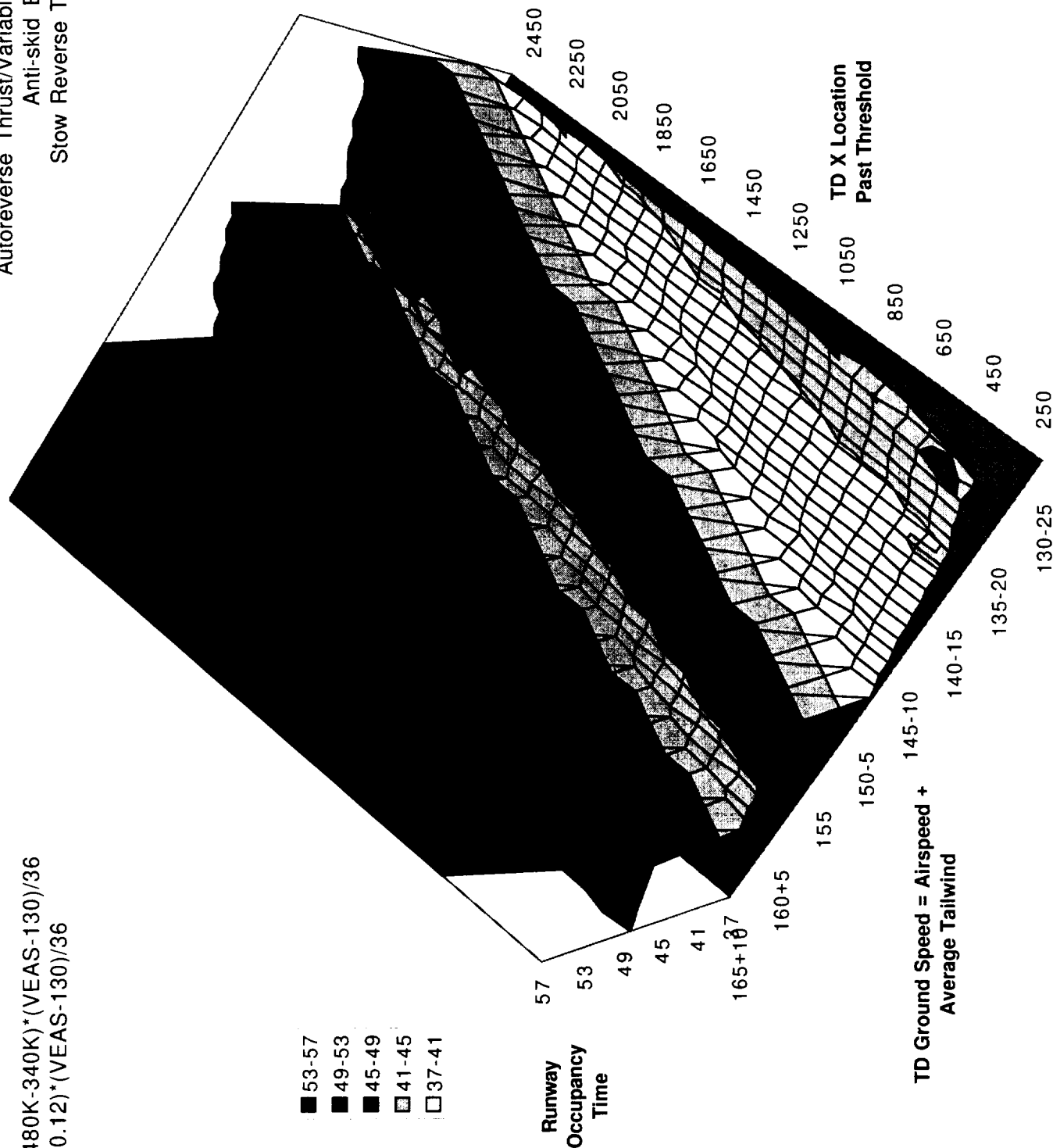
Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

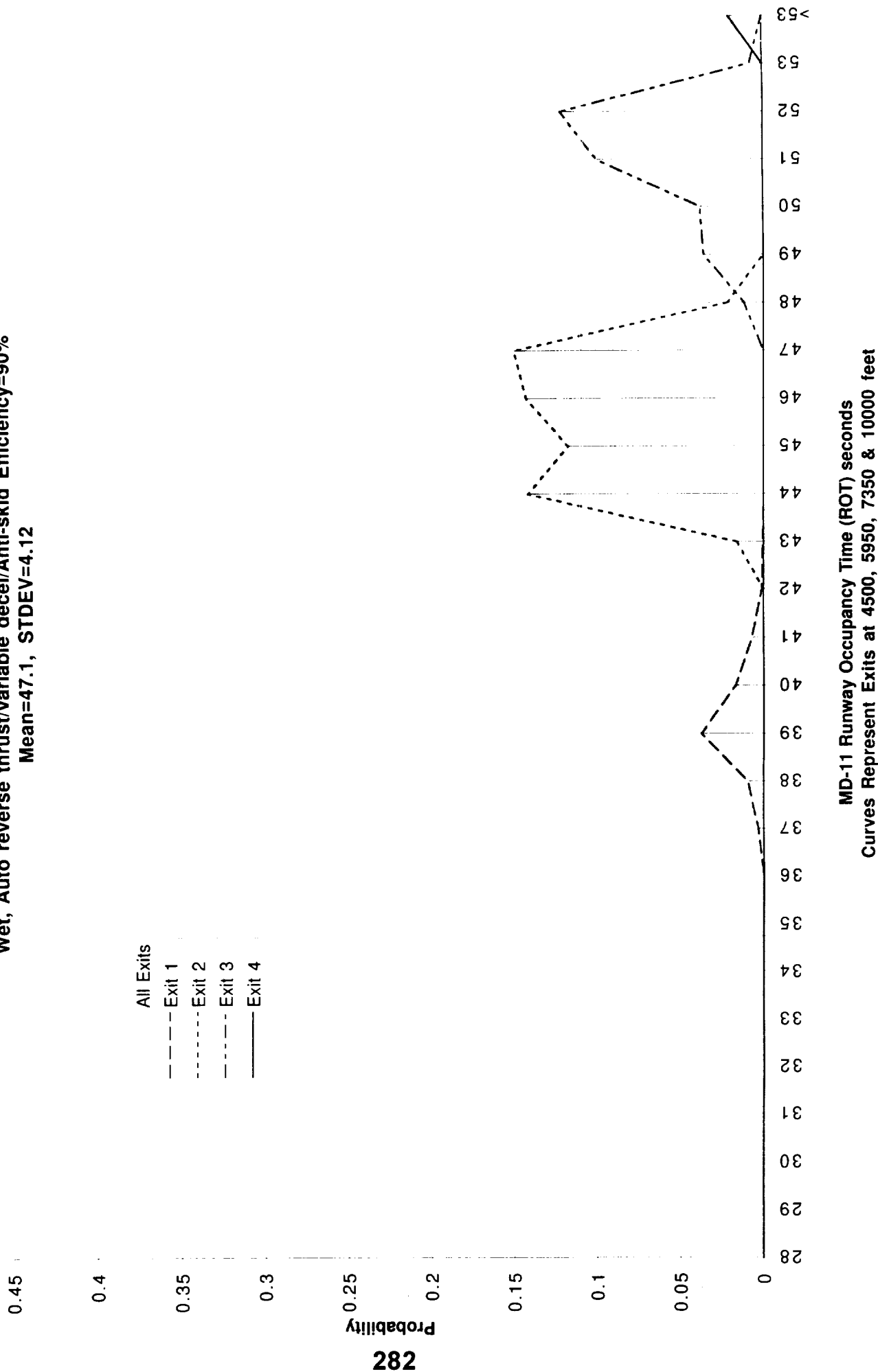
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/Variable Deceleration
Anti-skid Efficiency=90%
Stow Reverse Thrust=70 kt gd



MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Anti-skid Efficiency=90%
Mean=47.1, STDEV=4.12



Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (\text{VEAS} - 110) / 33$$

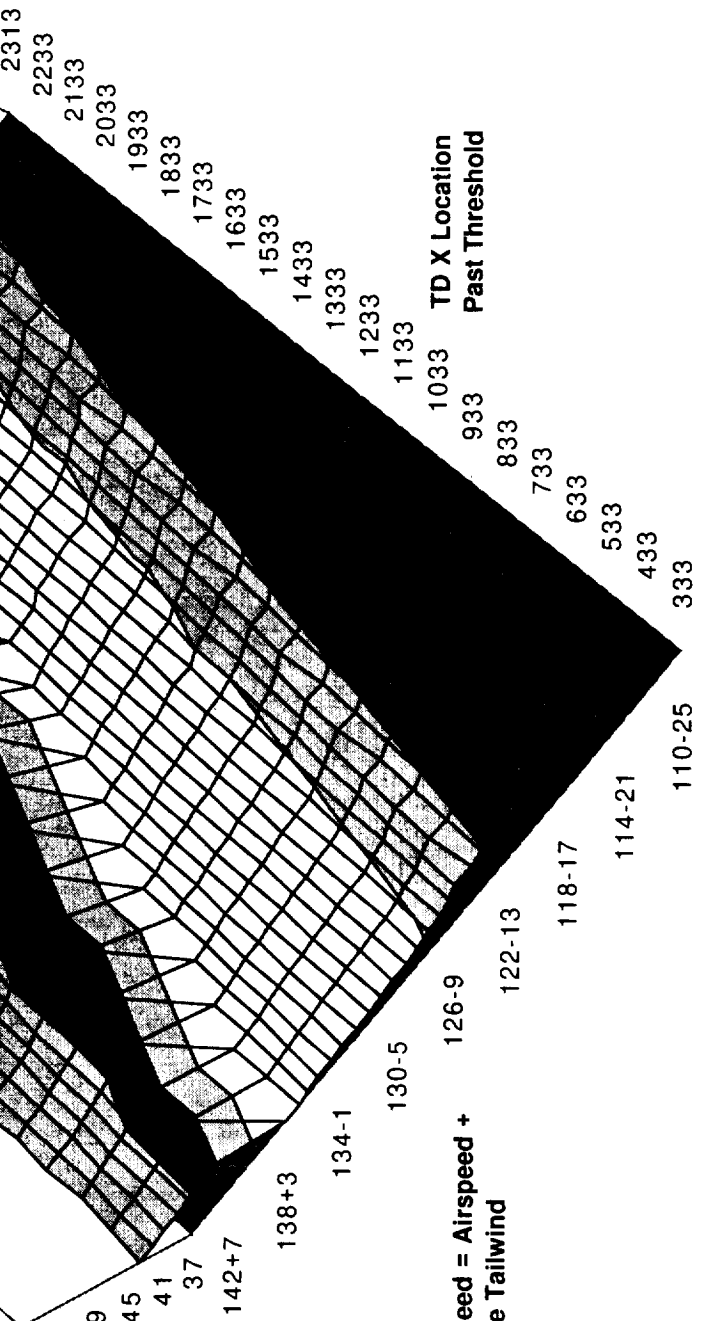
$$\text{CG} = -0.008 + (0.334 - (-0.008)) * (\text{VEAS} - 110) / 33$$

MD-81 ROTO Occupancy Time

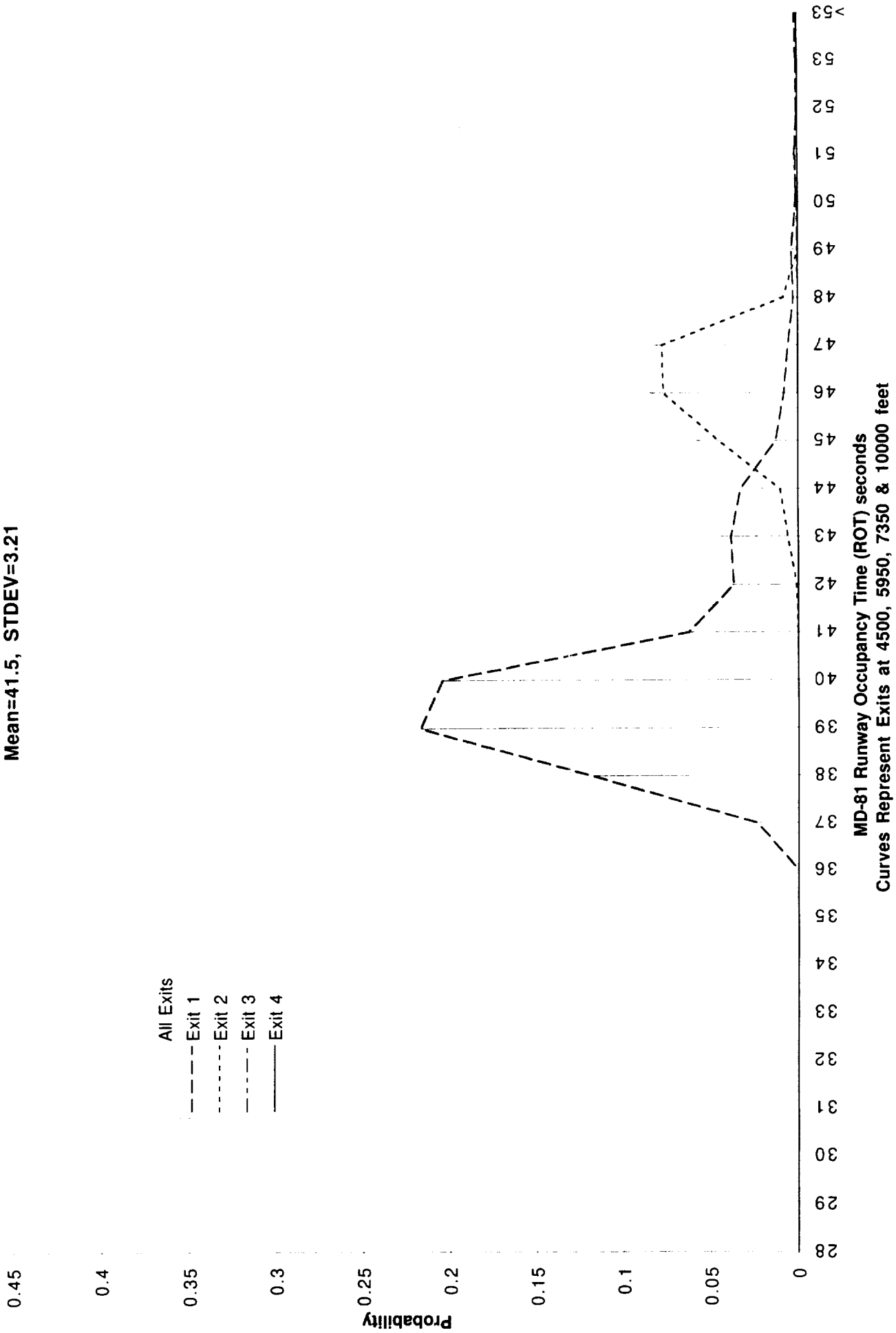
Wet, Exits=4500, 5950, 7350, 10000
Autoreverse Thrust/variable Deceleration
Anti-skid Efficiency=90%
Stow Reverse Thrust=70 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

Runway
Occupancy
Time



MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/Anti-skid Efficiency=90%
Mean=41.5, STDEV=3.21



Predict exit prior to TD

$$\text{Weight} = 340K + (480K - 340K) * (\text{VEAS} - 130) / 36$$

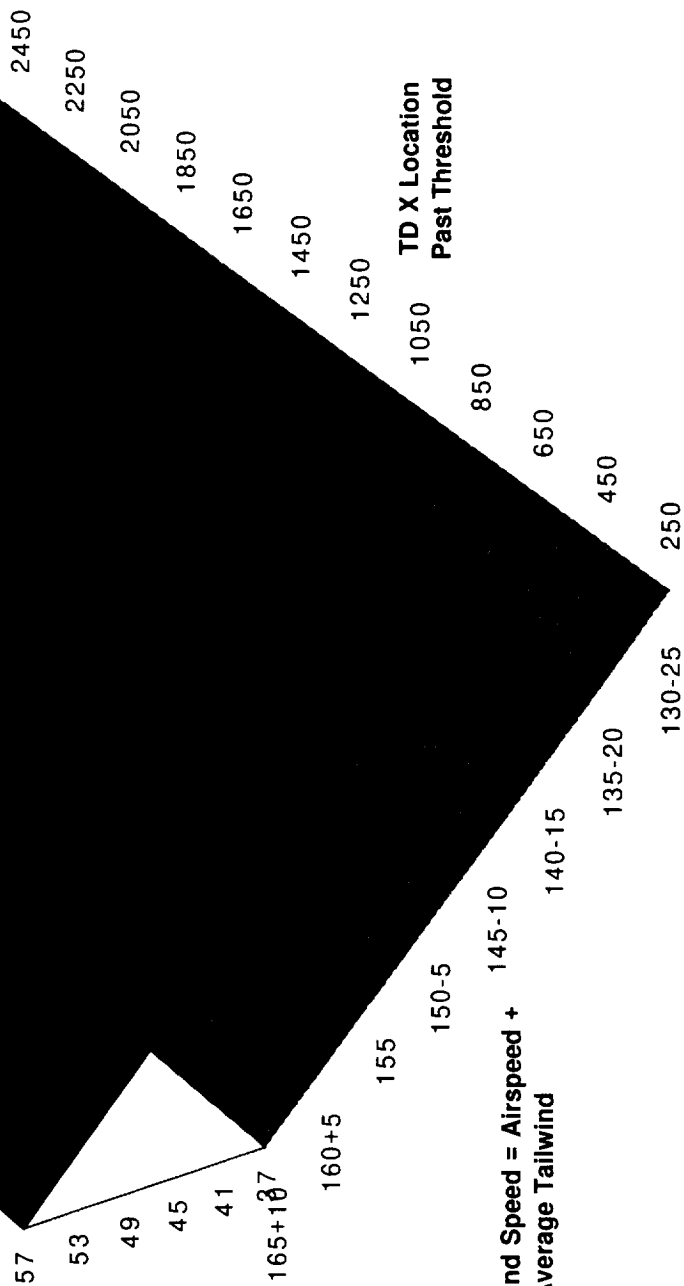
$$\text{CG} = 0.12 + (0.34 - 0.12) * (\text{VEAS} - 130) / 36$$

MD-11 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
Autoreverse Thrust/variable Deceleration
40 kt exit entrance ground speed
Stow Reverse Thrust=40 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

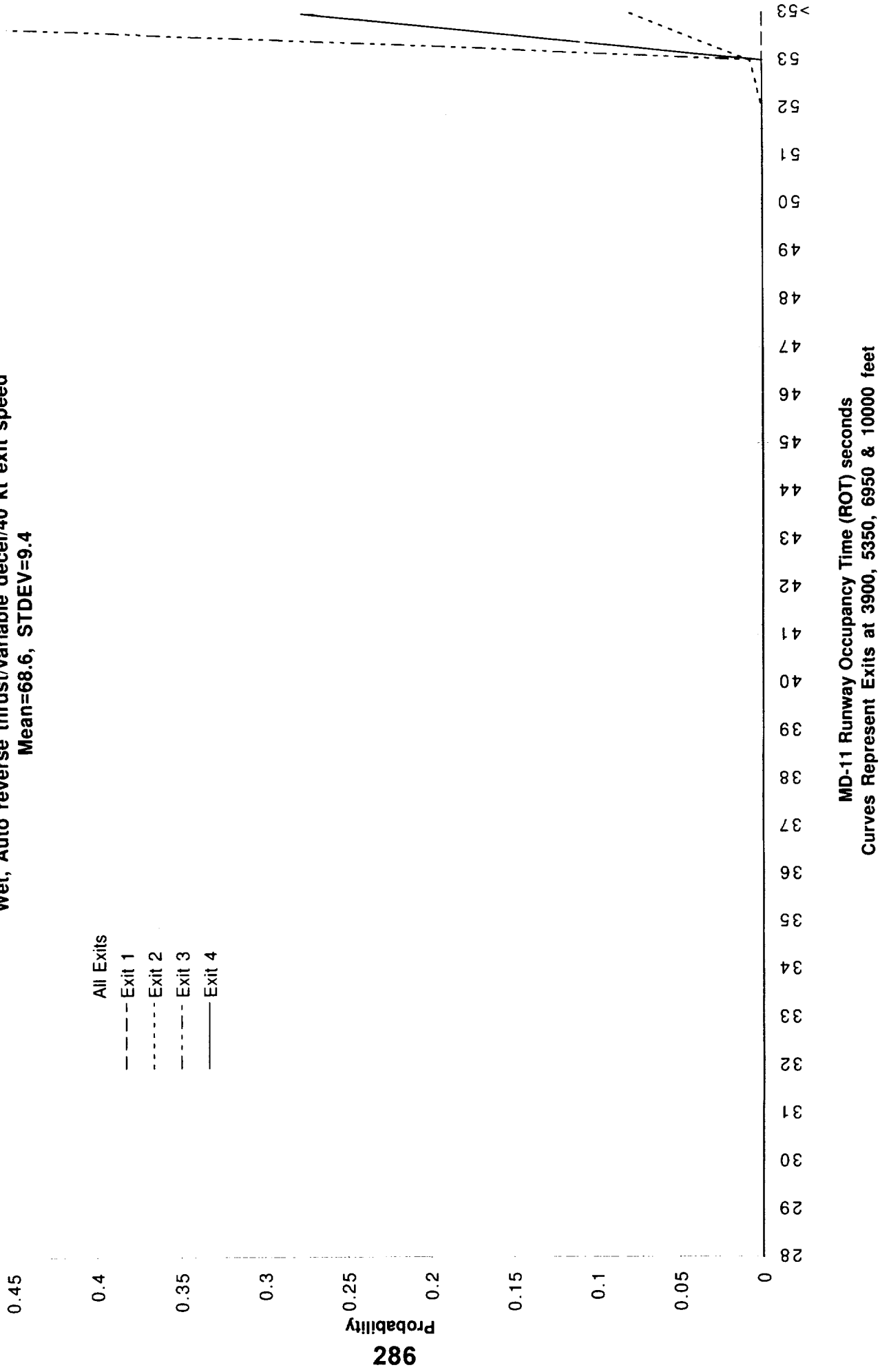
Runway
Occupancy
Time



TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-11 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/40 kt exit speed
Mean=68.6, STDEV=9.4



Predict exit prior to TD

$$\text{Weight} = 82K + (128K - 82K) * (VEAS - 110) / 33$$

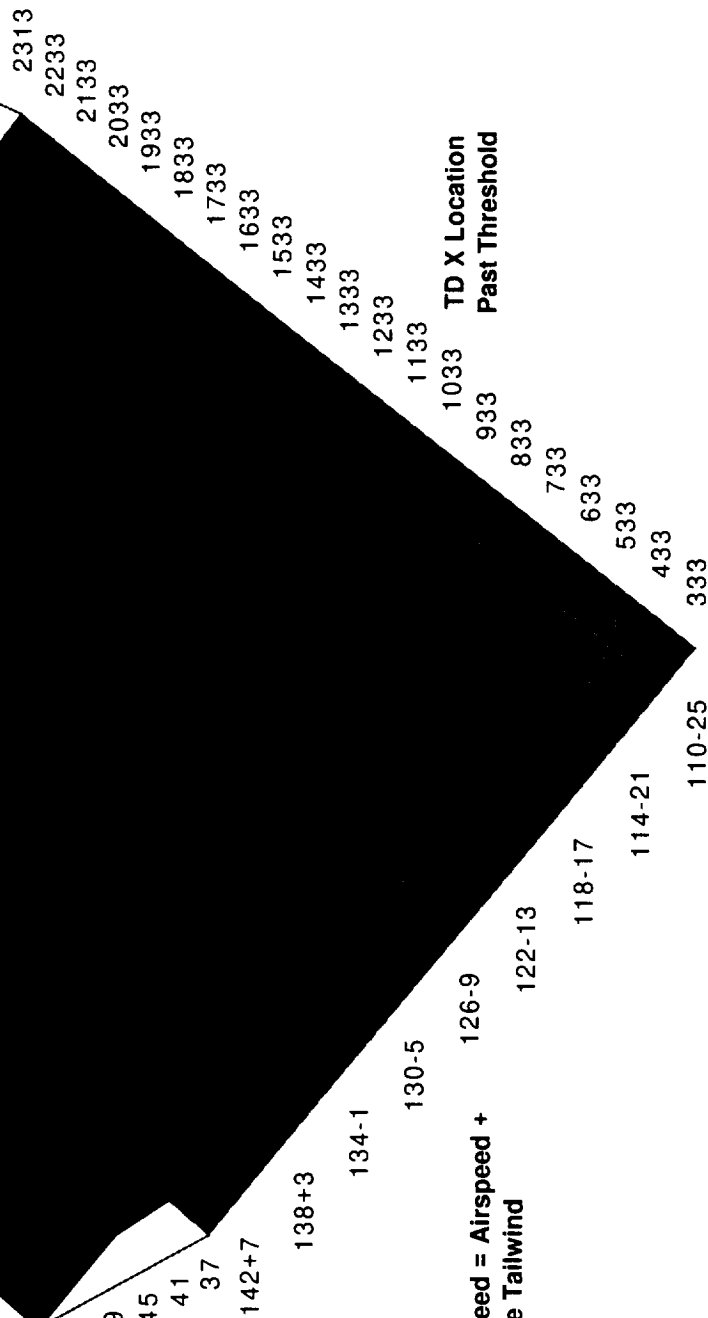
$$CG = -0.008 + (0.334 - (-0.008)) * (VEAS - 110) / 33$$

MD-81 ROTO Occupancy Time

Wet, Exits=3900, 5350, 6950, 10000
Autoreverse Thrust/variable Deceleration
40 kt exit entrance ground speed
Stow Reverse Thrust=40 kt gd

- 53-57
- 49-53
- 45-49
- 41-45
- 37-41

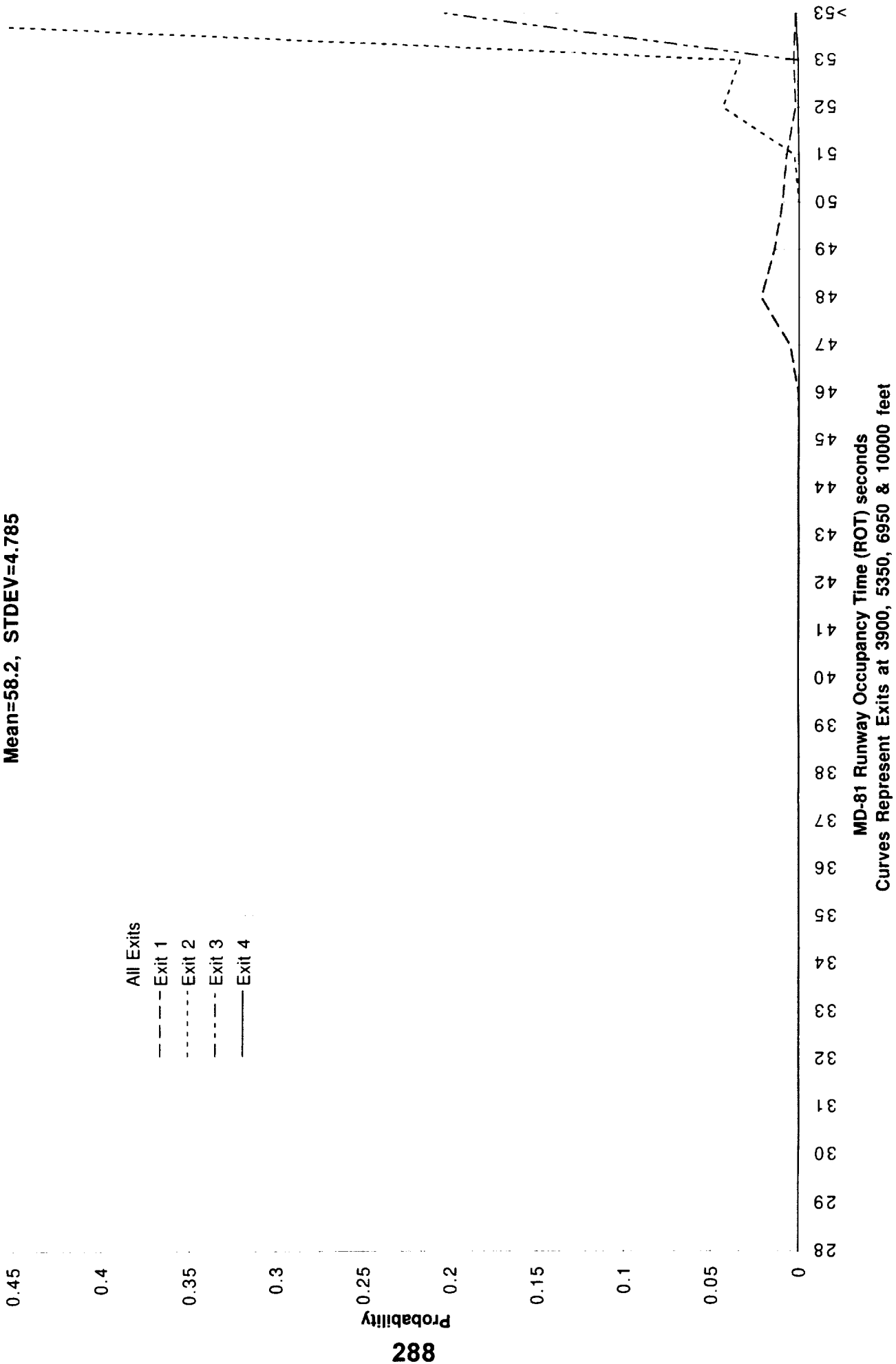
Runway
Occupancy
Time



TD Ground Speed = Airspeed +
Average Tailwind

TD X Location
Past Threshold

MD-81 ROTO ROT Probability Distribution
Wet, Auto reverse thrust/variable decel/40 kt exit speed
Mean=58.2, STDEV=4.785



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| 13. ABSTRACT (Maximum 200 words) The Terminal Area Productivity (TAP) research program was initiated by NASA to increase the airport capacity for transport aircraft operations. One element of the research program is called Low Visibility Landing and Surface Operations (LVLASO). A goal of the LVLASO research is to develop transport aircraft technologies which reduce Runway Occupancy Time (ROT) so that it does not become the limiting factor in the terminal area operations that determine the capacity of a runway. Under LVLASO, the objective of this study was to determine the sensitivity of ROT to various factors associated with the Rollout and Turnoff (ROTO) operation for transport aircraft. The following operational factors were studied and are listed in the order of decreasing ROT sensitivity: ice/flood runway surface condition, exit entrance ground speed, number of exits, high-speed exit locations and spacing, aircraft type, touchdown ground speed standard deviation, reverse thrust and braking method, accurate exit prediction capability, maximum reverse thrust availability, spiral-arc vs. circle-arc exit geometry, dry/slush/wet/snow runway surface condition, maximum allowed deceleration, auto asymmetric braking on exit, do not stow reverse thrust before the exit, touchdown longitudinal location standard deviation, flap setting, anti-skid efficiency, crosswind conditions, stopping on the exit and touchdown lateral offset. | | | | |
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